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STEAM NAVIGATION, COMMERCE, MINING, MANUFACTURES.

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Copper Ores of Lake Superior.
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The treaty for the cession of these lands to the United States was no sooner effected, than the whole territory bordering the lake was overrun by a host of adventurers. Some went to take possession by "*squatting*" on such tracts as they found unoccupied, and considered worth attempting to hold in opposition to those coming with claims apparently more legal; and others went provided with '*permits*' issued by the war department, as the President afterwards declared without legal authority. These permits authorised the holders to take such tracts as might select of three miles square each; and on the location being certified to by the agent sent out by the department as not interfering with others previously made, and bonds being given, a lease to work the tracts under certain conditions was granted.—This lease was to continue three years; then subject to two renewals of three years each, if Congress in the mean time should make no other disposition of the lands. The agent at Lake Superior soon began to issue permits as well as the Department of Washington; and had these been continued of three years each beyond the year 1844 there would have been little territory left from the pickings of the first comers. The extent of the locations was then reduced to one mile square; and in 1845 the work went on, and French Voyageurs, half-breeds, and children, who applied, received their permits and made their locations. Here it was the President declared the whole system unauthorised by law—that consequently the leases made were not valid, and no others could be granted to those holding permits not yet certified to. So the matter was left subject to Congress;—in the mean time, those having possession retained their rights, and continued their operations and the government agent called the 6 per cent. duty on all ore raised. During the session of Congress of 1846-7, a law was passed confirming the leases and providing for the sale of the lands on the expiration of each, giving to those in possession of leases a pre-emption to the whole they held at the rate of $2 50 per acre, or to a portion less than the whole at $5 per acre. Squatters too are entitled to purchase at the lowest rates.

It is not a little extraordinary, and a fact worth recording for the credit of our people, that notwithstanding the confusion and competition arising from this pouring in to an unsurveyed territory, reputed to be a perfect el dorado, and the unavoidable contentions that arose from conflicting claims, no single instance has come to my knowledge of parties actually resorting to violent means to maintain their pretentions. Threats, it is true, have been made, and obstinate stands taken, but no personal injury has been sustained, and the disputes have most of them been adjusted. Considering that all this has been going on in the very far west, and in a region where no legal jurisdiction had yet extended her protecting shield, and moreover that the class of mining adventurers do not enjoy the reputation of being the most peaceable people in the world, it certainly seems very extraordinary, that deeds of violence have not disgraced the region.

Extent of the Mining Region.—What may properly be called the mining district commences on the south shore of the lake at a point designated by Dr. Houghton, 150 miles west from the Sault, and thence extends to the very head of the lake, and around on the north side its whole length back to the Sault.—The head of the lake does not appear to be its termination, for Mr. Schoolcraft and Dr. Houghton and others have recognized the same geological formations on the tributaries to the Mississippi. Neither on the Canadian side does it terminate at the Sault; for mines of promising character have been opened on the shores of Lake Huron, and it is probable the formations are continuous throughout. All the islands in the northern part of the lake consist of the same formations, and add much to the extent of available mining territory. The largest of these, Isle Royal, belongs to the United States. What the width of the metalliferous belt may be it is impossible to say. Mining operations have been extended back on the south shore more than twenty-five miles, and the statements of those, who have explored the country, make it to reach very much farther than this. A strip of the width along the 200 miles of the south shore would give 500 square miles of mining territory; and on the north shore, 350 miles in length, 8750 square miles. The United States own the territory on the NW. side of the lake as far to the eastward as Pigeon river; it is held however at present by Indian tribes. A considerable portion of this tract I have marked out is occupied by rocks not likely to prove metalliferous, as the sandstones and conglomerates associated with the traps and amydaloids and porphyries. Their relative extent cannot be ascertained. They occur together, often in alternating bands of a few yards in thickness, so that the whole district must be considered as the mining region.

Keewenaw Point.—The most promising portion of this district, at least on the American side, is that large headland projecting out into the lake called Point Keewenaw. It is usually the first land made by vessels sailing from the Sault, and here they find the most convenient harbors. At the first, called Copper Harbor, the government has secured at beautiful spot for a militia garrison on the banks of the lovely little lake called Fanny Hooe, which lies embosomed in the forrest and hills just back from the Harbor. Here quite a village is springing up, and the place promises to be one of considerable importance. Agate Harbor and Eagle Harbor are both also on the north side of the Point. The former very deep, well protected and capacious, the latter, though likely to be as important as any of them, cannot at present be safely entered at all times by vessels drawing more than six feet of water.—The north shore of this promontory is formed of rocks of sandstone and conglomerate, whose range is parallel with the coast, and whose dip is at different degrees of steepness always towards the lake. Belts of greenstone traps, which appear to have been protruded between the sandstone strata, run parallel with them, and at point of contact with them an amygdaloidal. The hills forming the axis of this headland commences near the water at the point,

and ore there is part conglomerate and part trap.—Back of Copper Harbor, the great trap belt of hills is fully developed, which continues without interruption nearly parallel with the coast to the head of the lake. South of this belt the red sandstones are seen again, and other belts of igneous rock, which partake more of the porphyritic character than is usual in the trap of the northern belt. The height of these hills is sometimes nine hundred feet above the lake. I found, by careful barometrical examination, that the highest point on the Albion location at the head of the west branch of Eagle river is 860 feet above the level of the lake, and this point is evidently somewhat lower than others seen towards the east. H.

Steam Boiler Explosions.
No. 2.

The next hypothesis set up to account for the explosion of steam boilers is, that, when the water in the boiler has been much reduced below the proper water line, it foams up above its surface, comes in contact with the heated metal, is converted into gas or steam, and that by the ignition of the former or pressure of the latter, an explosion is caused. The hypothesis relative to the generation and explosion of *gas* we have, we think, disposed of in a former number. But, allowing the water to foam as supposed, and that foam to be converted into steam, and the boiler to be exploded in consequence, what would that prove? The question now is, can the explosion be caused by the foaming of the water? It is well known that that part of the water converted into foam or froth contains but a small portion of water; and that, consequently, it could yield but a very little of steam. A steam boiler, to be at all trustworthy, should be capable of bearing, at least, double the pressure it usually sustains when worked. Working with a pressure of sixty pounds in the square inch, the boiler should be capable of sustaining one hundred and twenty pounds; and it cannot be supposed that the quantity of water in the foam or froth if entirely converted into steam would add sixty pounds per square inch to the pressure. If not, then the increased pressure would not explode the boiler unless it had some defect, which would render it unfit to be used with a pressure of sixty pounds to the inch. But, it is not true that the foaming of the water can produce such an effect. Of this body of foam, only the outer surface can come in contact with heated metal; and to convert its watery particles to steam, the heat must be gradually transmitted from particle to particle thorugh the whole body and, be intermingled with the body of steam in the boiler: and its own temperature must be reduced in the same ratio as that of the water and steam would be increased by it. The latent heat existing in the steam generated from the foam cannot raise the temperature of the water and steam in the boiler so as to increase the force some thirty, forty, fifty or sixty pounds to the square inch. Those who speculate do not seem to take these circumstances into the account. They appear, in the first place, to consider the exploded boiler as having been faultless, and working at a safe pressure. In the second place, to account for its explosion, they reason as if the foam was a solid body of water, and that, the moment it comes in contact with the heated metal, the whole mass was instantly converted into steam of a high temperature and elasticity, acting as suddenly and powerfully as gunpowder.—Such cannot be the fact. The conversion of the foam or froth into steam, cannot be instantaneous. It must be gradual. There can be but a very small quantity of it generated at a time; and the force of it could not be so great as to produce the effect to explode a good boiler, carrying no more than the ordinary head of steam, supposing the engine in the mean time at work. The writer, who has been practically acquainted with the steam engine for something like twenty years, is somewhat skeptical about this whole history of foaming.

All that can be known of this is mere conjecture founded on certain external appearances. That there is no ebulition in a steam boiler, and that there can be none is a well known fact. The pressure of the steam on the surface of the water effectually prevents that. How then can it be that the pressure which prevents even the appearance of a bubble on the surface of the water, should permit the water to foam up in the same manner as if unconfined? To ascertain the height of water in the boiler, the engineer opens one or more of the gauge cocks. Should the surface of the water happen to have fallen below them, it is probable that there will be a discharge of a quantity of spray or vapor, which, from its color and consistence, may impart the notion that the water within is furiously foaming; but this is owing undoubtedly to the great pressure by which the steam is forced out, and its coming in contact with the low temperature of the atmosphere.

A similar mistake, or one growing out of an error leading to the above conclusion as to the foaming of the water, is made by many persons on viewing a steam boiler immediately after its explosion. The fracture in the boiler may have taken place on the upper side, and it may not have been removed from its bed—yet it is found entirely destitute of water. From these facts, the conclusion is, that the water was deficient, if not entirely exhausted, previous to the explosion. This is a great error.—The boiler at the time of the explosion may be two-thirds filled with water, yet upon examination immediately after the explosion, and you will find it empty. The truth is, nine tenths of the water, up to the instant of the explosion, remained in its original form. The other tenth had been converted into steam. But both the steam and water were of one apparent temperature, and when the explosion took place, and the water relieved from pressure, the whole of it was converted into steam. For the same reason if the guage cocks be kept open, in a short time, they would discharge every gallon of water from the boiler in the form of spray, after its surface had decended below their level; and it appears very evident, from these well known facts, that no discharge from the guage cocks can furnish even the slightest proof of the foaming of the water.

When but one boiler is used, the gauge cock, as a general thing, pretty accurately indicates the *height* of the water, but even this is not always a certain test. Numerous experiments, during a long experience, have fully satisfied me, that the water, from some cause, is inclined to follow the course of the steam. In the furnace of a single boiler, the fire may be, and frequently is, more intense in one part than in another. The effect is, constantly to impart a greater degree of heat to one portion of the water than the other. True, this heat is rapidly diffused over the whole boiler; but as long as a disproportionate degree of heat is kept up in any one part, the equalization cannot become perfect. The water in consequence, will become lower in one part of a boiler than in another. Hence, the gauge cock may at one moment indicate a sufficiency of water, and at the next moment a deficiency; without any actual change having occurred. Where a number of boilers are used in connection, these aberations are more numerous, and more striking. In this case, not only may there be disproportions in the degrees of heat, between the different parts of one boiler, but also, and necessarily, between the different boilers, compared with each other. The result is, that the water will be found higher in some boilers than in others; and in one boiler, in which the water may be found below the gauge cock at one moment, it may be above it at the next. It is on these changes, which result from the tendency of the water to follow the course of the steam, that the entire hypothesis of *foaming* is founded—an hypothesis, in the opinion of the writer, entirely falacious.

My firm conviction is, that the gauge cock is not an unerring test either of the sufficiency or deficiency of water, unless it be very high, or very low, at best, not sufficiently so as to obviate the error originating in the unequal distribution of heat. For the reasons also given, I am as firmly convinced that the water in a steam boiler does not and cannot foam; that no good evidence of the supposed fact can be derived from the operations of the gauge cocks; and even if it did, and should come in contact with red hot iron, the additional quantity of steam generated by that means, could not have the effect assigned to it. C. T. J.

The Tubular Bridge over the Menai Straits.

During the early part of the past week the shores of the Menai, already celebrated for its suspension bridge, which carries the road way from the Carnarvon to the Anglesey shores, at an extraordinary elevation above the stream at high water, have been crowded by thousands of visitors and tourists, to witness the fixing of the tubular bridge that is to carry the Chester and Holyhead railway across the same chasm, beneath which a deep and rapid arm of the sea is ever running.

The particular spot at which the Brittania bridge crosses the Menai straits, is exactly a mile nearer to Carnarvon than the suspension bridge; the railway after leaving the end of the bridge passing close under the Anglesey column. The shores are of the same precipitous and shelving character at both places, but the stream is wider here than at the suspension bridge, being about 1100 feet across at high water. It is divided nearly exactly in the middle by the Britannia rock, which at high water is covered to a depth of ten feet. The rise and fall of the tide is ordinarily 20 feet, and its velocity very great, often as much as eight miles and a quarter an hour. It is from the Britannia rock that the bridge takes its name, the centre pier being based upon it. It and the Anglesey shore consists of chlorite schist, a very hard and intractable kind of rock, worked with great difficulty; from this and the circumstance that no coffer dam was used, and therefore, few hours only could be consecutively spent on the rock, some months were passed in laying the bottom course of the tower. It was commenced in May 1846, the first stone being laid, without ceremony, by Frank Foster, Esq., acting engineer of the railway between Conway and Holyhead, and of the masonry, scaffoldings, etc., of the Britannia bridge.

The stone of which the towers are built is a hard carboniferous limestone or marble, called Anglesey marble; it abounds in fossils, and is capable of receiving a very high polish. Some specimens of it are very handsome. It is obtained from quarries expressly

opened for the purpose on the sea shore at Penmon, at the northern extremity of the island, where it abounds in great abundance. and in convenient strata of every thickness, from three to four feet downwards The stones are split off with great dexterity by iron wedges, and wrought into shape with heavy steel picks. Some of the stones in the work are no less than 20 feet in length, and others weigh from 12 to 14 tons. A great portion of the interior masonry, however, is built of red sandstone, from Runcorn in Cheshire. This is a very soft stone, and easily worked, but at the same time very durable, especially when not exposed. The stones in the towers are all left with a rough or quarry face, except at the angles, and in the recesses, and the entablature at the top. This circumstance, coupled with their immense size and height, gives the towers a truly noble appearance. The abutments on either side of the straits, are huge piles of masonry.—That on the Anglesey side is 143 feet high, and 173 long. The abutment on the Carnarvonshire side is nearly as large, but owing to the elevation of the ground, the masonry is less in altitude. The wing walls of both terminate in splendid pedestals, and on each are two colossal lions, couchant, of Egyptian design. These lions, like the tube they adorn, are on a gigantic scale, each being 25 ft. long, 12 ft. high, though crouched, 9 ft. abaft the body, and each paw 2 ft. 4 in. They contain 8000 cubic feet of stone and weigh 120 tons.

When the whole structure is completed, it will consist of two immense wrought iron tunnels or tubes, each considerably upwards of a quarter of a mile in length, placed side by side, through which the up and down trains will respectively pass. The ends of these tubes rest on abutments, the intermediate portions being supported across the straits by three massive and lofty stone towers. The centre tower, as has been just observed, stands on a rock, which is covered by the tide at high water. The side towers stand on the opposite shores, each at a clear distance of 460 feet from the centre tower. The abutments are situated inland, at a distance of 230 feet from the side towers.

The Britannia tower is 62 ft. by 52 ft. 5 in. at the base; it has a gentle taper, so that where the tubes enter it is 55 ft. by 45 ft. 5 in. Its total height from the bottom of the foundations will be, when completed, nearly 230 ft.; it contains 148,625 cubic feet of lime stone, and 144,625 ot sandstone, weighing very nearly 20,000 tons, and there are 387 tons of cast iron built into it in the shape of beams and girders. The total quantity of stone contained in the bridge is 1,500,000 cubic feet.

The land towers are each 62 feet by 52 ft. 5 in. at the base, tapering to 55 ft. by 32 at the level of the bottom of the tubes; their height is 190 ft. from high water; they contain 210 tons of cast iron in beams and girders.

The bridge itself is divided into four spans, viz: the two small spans at each end, which are over the land, and are each 230 ft. wide, and the two principal spans which are over the water, and are each 460 feet wide. The small tubes, as they are termed, or those which cross the land, being constructed on the platforms, at their ultimate level, do not require any removal. Although called the "small tubes," their span is vastly greater than that of any other railway bridge in existence, the Conway tubes alone excepted.—But the large tubes, which are to cross the water, were constructed on timber platforms along the beach, on the Carnarvon shore, just above the level of high water. The length of one of these tubes, as constructed on the platform, is 472 ft, that is, 12 ft. longer than the clear span between the towers. This additional length is intended to afford a temporary bearing of six feet at each end after they are raised into their places, until there is time to form the connection between them across the towers. Our readers will better appreciate the length of these tubes by remembering that if one of them were placed on end in St. Paul's church yard, London, it would reach 107 feet higher than the top of the cross!—The span is much greater than has ever before been attempted, except in bridges on the suspension principle. The length of the iron arch of Southwark bridge, in London, the largest rigid span in this country, is but 240 feet.

Each tube consists of sides, top and bottom, all formed of long narrow wrought iron plates varying in length from 12 feet downward.—The direction in which these plates are laid and riveted together is governed by the direction of the strains on the different parts of the tube. They are of the same manufacture as those for making boilers, varying in thickness from three eighths to three fourths of an inch. Some of them weigh nearly 7 cwt., and are among the largest it is possible to roll with any existing machinery. In the sides the plates are 6 and 8 feet long, and half an inch thick, but the longest plates are in the bottom, being 12 ft. long, by 2 ft. 4 in. wide, arranged in double layers. At the top they are 6 ft. in length and 1 foot 9 inches in breadth. The connection between top, bottom and sides, is made much more substantial by triangular pieces of thick plate riveted in across the corners to enable the tube to resist the cross or twisting strain to which it will be exposed from the heavy and long continued gales of wind that, sweeping up the channel, will assail it in its lofty and unprotected position. The rivets, of which there are 2,000,000, each tube containing 327,000, are more than an inch in diameter. They are placed in rows, and were put in the holes red hot, and beaten with heavy hammers. In cooling, they contracted strongly, and drew the plates together so powerfully that it required a force of from four to six tons to each rivet to cause the plates to slide over each other. The total weight of wrought iron in the tube floated on Tuesday is 1600 tons.

The height of the tubes is not the same at all parts of their length. It is greatest at the centre, in the Britannia tower, where it is 30 ft. outside, and diminishes gradually towards the ends, at which, in the abutments, the external height is only 22 ft. 9 in. the top forms a regular arch (a true parabolic curve) and the bottom is quite straight and horizontal.—The clear internal height is on account of the double top and bottom, less by four feet than the external, being 26 ft. at the centre, and 18 ft. 9 inches at the extreme end. The land tubes are outside 27 ft., and inside 23 ft. high at their small ends. The internal width from side to side is 14 feet, though the clear space for the passage of the trains is but 13ft. 5 in. The whole width, outside, is 14 ft. 8 inches.

Each tube contains about 10 miles of angle and T iron, and the whole bridge 65 miles. The weight of the wrought iron in one of the large tubes is estimated at about 1600 tons, of which 500 are in the bottom, 600 in the sides, and 500 in the top.

The resident engineer of the iron work of the Britannia and Conway bridges, and of the floating and lifting operations connected with them, is Mr. Edwin Clark; the immediate command during the operation of floating being at both places entrusted by Mr. Stephenson to Captain Claxton, R.N., who so distinguished himself in assisting to extricate the Great Britain from her perilous position in Dundrum bay.

Tuesday, the 19th, was the day fixed upon for the floating of this stupendous work.—The attendance of visitors was immense.—The morning opened unpropiciously, with a high southwest wind and heavy driving showers, but as the sun moved towards the meridian the wind droped, the rain discontinued, and the weather, as well as everything else, worked well for the coming off of the experiment. The scene as early as 6 o'clock presented a very busy appearance, multitudes of men depositing the buoys, and shipping the enormous cables from the London and Manchester platforms of the work. The experiment of floating was to be made in the evening at 7 o'clock, but when the time arrived the attempt was suddenly averted by the breaking down of a capstan, and the floating was postponed till the rise of the next tide. The accident arose from no insufficiency of strength in the capstan itself, but from the fact of the shore lashing behind the tube not having been cut away or detached from the tube, and as a natural consequence, while the capstan was employed in drawing the tube our into the stream, the shore lashings detained it, and the capstan, failing to overcome the resis'ance, started, strained and broke. On Wednesday morning the capstan on the renewed attempt, again failed, but at half past nine o'clock in the evening the final operations for placing this magnificent work were completed, and the tube fixed firmly upon its bed, amidst the loudest demonstrations of approbation from all the spectators assembled upon this interesting occasion.

In addition to Mr. Stephenson Captain Claxton, Mr. Clarke, Mr. Brunnel, and Mr. Locke were on the tube, rendering valuable and unceasing assistance throughout the perilous process. The applause of the multitude, mingled with salutes of cannon, continued for upwards of half an hour after the

completion of the experiment, which was celebrated by the engineers on the tube and pontoons in successive rounds of champagne. The tube was floated obliquely, and then gradually swung round, with its face to the space between the piers. Arrived here, the next step was one of the most anxions character, seeing that if, from the run of the tide, or any giving way in the great net work of tackle, or the tube overstepping the line of destination parallel with the piers, the experiment must have failed, and the process of bringing it back would have been one of great difficulty. Fortunately, however, such was the nicety of the arrangements, and skill, and quickness of the directing power on the top of the tube, and the moment of its progress to the spot so geometrically measured, that the success of the final step was unerringly secured by the vigorous action of a giant vice upon the Anglesey end of the tube, which clinched its extremity, and instanly held it fast. The next operation, that of elevating the tube to its permanent position, will be accomplished as soon as possible. This is to be done by huge hydraulic presses, of a magnitude commensurate with the size of the works, one cylinder alone being almost large enough at the entrance to contain a man standing, and of the ponderous weight of 40 tons. It is the most powerful machine ever constructed. The two end tubes will now be raised, and it is expected from the rapidity of the movements that this great iron highway over the Straits will be ready for the passage of trains in the autumn.—*Liverpool Times.*

English Items.

Calcined Granite as a Material for Fictile Purposes.—Experiments have lately been made by Mr. Archibald M'Donald, at the Seyton Pottery, Aberdeen, upon calcined granite as a substitute for clay in the manufacture of pipes and other earthenware articles. He states, in a note to us, that the material stands a strong fire, and is not affected by transitions from heat and cold. The native color of the stone can be nearly retained in the formation of busts, statues, vases, urns, and general pottery, as also in chimney pieces, spouts, and chimney cans. In such articles as are intended to withstand the effects of great heat, where an extract only of stone is used, the color cannot be kept so well—as, for example, retorts, crucibles, and melting pots; but any preparation of the material, when once properly finished, may be heated to whiteness without injury. Up to the present time, the experimental trials have been carried on under every disadvantage, as, from the circumstances of the inventor, the preparation of the material has been entirely performed at spare moments in his own dwelling house, the articles being afterwards carried to the pottery to be fired. As the existing furnaces would not fuse a suitable glaze, the ordinary brown ware glaze had to be used, thus spoiling the true tint of the stone. Mr. M'Donald is also the possessor of a new composition for coating ship's bottoms, as a preservative.—It is a transparent black, not brittle, but very adhesive, and it is said to destry marine insects and prevent vegetable deposit.—*Prac. Mech. Jour.*

Writon's Elastic Screw Coupling for Railway Carriages.—This is an ingenious adaption of springs to the screw-coupling apparatus of Mr Booth, being intended as a substitute for the usual buffing and draw spring apparatus. The thin ends of the right and left screw-spindle are tapped into the ends of two tubes, bored out a little wider than the diameter of the screws, except at one end, which acts as a nut. These tubes pass through cross-pieces, in which they slide, but are prevented from turning round by a flat on the side; and between each cross-piece, and a flange at the opposite end of the tube, is placed a helical spring, coiled upon the tube.—Each cross-piece has two pins on its ends, to which are attached the double draw-links, for hooking on to the buffer draw-hooks. When the coupling is tightened up in the usual way, by the weighted pendant lever in the centre of the screw-spindle, all the strain is transmitted through the two helical springs which, by their elasticity, prevent any sudden blow or shock, the tubes sliding through their cross-pieces as the springs are extended or compressed. The apparatus presents a very neat combination of a coupling and buffing and draw-spring apparatus in one arrangement, and will be found very advantageous in its application to wagons with dead draw-hooks and solid buffer-ends. In some late trial with it on the Eastern Union Railway, two trucks, with dead draw-hooks and solid buffer-ends, were connected by one of the couplings, and attached to one of Slaughter & Co.,s 15-inch cylinder luggage engines, with as many loaded trucks behind as the engine could draw. This train was drawn and shunted about at the Ipswich station, without causing any shock between the coupled trucks, although frequently started and stopped in a sudden manner.—*Ibid.*

Governors in Screw Vessels.—The principle in this apparatus is the same as that of the land engines being a machine for controling the throttle-valve, as occasion requires. Two heavy balls are suspended by means of arms to an axis revolving with the engines. The upper ends of these arms are jointed to the axis, and therefore, as the axis rotates, the balls will fly out from it; and their distance from the axis will depend on the velocity. The arms by which the balls are suspended are connected with rods, which give motion to the throttle-valve, and are so arranged, that as the engines move faster, and therefore the balls fly out farther, the valve shall begin to close; and if the engine relax in its speed, and the balls droop towards the revolving axis, the valve will open. Governors are sometimes fitted to screw-steamers of light draught of water, to limit the supply of steam to the cylinders when the ship pitches. For, since the propeller is at one extremity of the vessel, it will at times, by the pitching of the ship, be performing its revolutions in the air; the engines will then be relieved of their load; and if the supply of steam were not reduced, they would fly off at a great velocity, which would again be checked as the stern of the vessel became immersed in the water. This would be detrimental to the machinery. The governor is so adjusted, that when the speed of the engines is about 40 per cent. above what ought to be their maximum, the throttle-valve closes, and admits no more steam till the revolution decreases, and thus lessen the centrifugal force acting on the balls.—*The Marine Steam-Engine.*

Method of Working Marine Engines without Cylinder Covers, in case they are broken by any accident.—It can be effected in this way. Let the broken cover be removed, and the upper steam-port blocked up with a piece of wood, so shaped as to prevent its being forced inwards towards the slide by the pressure of the atmosphere; the orifice is made steam-tight by interposing fear-nought between the wood and the edges of the port. The wood must be kept in its place by two shores, one on each side of the piston-rod, pressing with one end against the wood, and with the other against the opposite side of the cylinder. The steam will be admitted, therefore, to the *under* surface of the piston, but not by the *upper* surface; the upper surface will be acted on by the atmosphere alone. Now, since the pressure to which the steam is raised is considerably above that of the atmosphere, the piston will be forced up against the resistance the air exerts; and, on creating a vacuum underneath the piston, it will be forced down by the atmosphere. To prevent irregularity, we should not create too good a vacuum;—thus, if the steam has a pressure of 10 lbs. above that of the atmosphere, we have an effective upward pressure of 10 lbs., and consequently the downward pressure should be about 10 lbs. But the pressure of the atmosphere is 15 lbs.; hence we may have a back pressure of 5 lbs., arising from the uncondenced steam, or a deficiency from a vacuum amounting to 10 inches of mercury; and since a perfect vacuum amounts to 30 inches, the height of the barometer-guage should be about 20 inches. In most engines this precaution is unnecessary, and need only be used when unpleasant jerks are experienced as the wheels rotate. This method has been tried very successfully in H. M. S. *Bee*, which has only one engine, and where, in consequence, it was most likely to fail, on account of the difficulty of turning the centres. The vessel's rate was found to be about two-thirds her ordinary speed. If the engines be fitted with Seware's slides, we need only detach the upper slides on the steam and vacuum sides when covering the upper ports.—*Ib.*

Improvements in the Steam Engine.—Messrs. J. & G. Davies, of the Albion Foundry, Staffordshire, have just obtained a patent, the improvements sought to be secured by which are as follows:

1. A mode of converting rectilinear into rotary motion, by supporting the crank pin in brasses which slide in the cross head of the piston. The brasses, as they wear away, are to be screwed up tightly, and the piston is made to pass through the crosshead and give motion to the piston of a blowing machine.

2. The rectilinear motion of the piston of a blowing machine is converted into a rotary one, and communicated to a shaft by means of a rod keyed loosely to the end of the piston rod of the blowing machine, and passing through a sliding stuffing box in the side thereof. The other end of the rod is connected to the crank pin.

3. The steam induction and eduction ways, both at the top and bottom of the cylinder, are each worked by two valves fixed on the same spindle, which are constructed of slightly different diameters, so that the pressure to be overcome is that due to the difference in the diameters.

4. The same principle is proposed to be applied to the construction of valves in the feed pipes of steam boilers.

5. The apparatus for working the dampers consists of a pipe communicating with the boiler, and closed at the top by a valve, which is weighted at less than the safety valve. Above the valve is placed an inverted vessel, which is connected at top to the damper, and is fixed in equilibrium, with the sides dipping into the water contained in the exterior casing of the steam boiler pipe. This casing is provided with an overflow pipe. It follows that when the valve is opened by the increased pressure of the steam, the inverted vessel will be lifted up, and the dampers partially or wholly closed. When the valve is closed, the inverted vessel will descend into its first position.

Claims: The mode of fixing the cross head to the piston, so that it may pass through it and give motion to the piston of a blowing machine; also the use of the brasses. The arrangement for converting rectilinear into rotary motion. The mode of working the steam valves. The method of working the feed valves of steam boilers. The mode of working the dampers.

Consumption of Smoke.

All who have, for a few years, been acquainted with the towns of Manchester and Salford must have noticed a marked change in the purity of the atmosphere. Instead of the dense volumes of black smoke vomited forth by a thousand chimneys of steam-engines, until the air was thoroughly impregnated with soot, begriming clothes, goods in shops, and penetrating every room, the atmosphere is now comparatively clear, and the factory chimneys present a totally different appearance in the quality of the vapour they now distribute. This has been brought about by the authorities under the corporation, who are now empowered, by their local Acts, to enforce the application of those known means for the prevention of the emission of smoke which are easily applicable. Among these is a plan patented by Messrs J. and W. Galloway, of Knot Mill Iron-Works, which has proved highly successful wherever it has been applied; and upwards of 300 boilers are said to be fixed on this principle in the neigborhood. The construction is simple; the boiler is cylindrical, and is furnished at the front, extending the length of two sets of fire-bars, with two distinct flues, having a water space between them. These flues then gradually converge into one central flue, which traverses the remainder of the boiler. Each grate is fired alternately, so that the dense smoke, unconsumed carbon, and vapours, which pass from the newly applied coal, rush over incandescent fuel in the other grate, and are con-

sumed in passing over the bridge with the vapours from both fires; by the time the last made fire is clear the other will require firing, and so on alternately. It is stated that, as a general average, there is a saving of 30 per cent. in coal; and Messrs. Cooke, of the Oxford-road Twist Company, have six large boilers fitted on this plan, by which 70 tons of coal per week performs the same work as 100 tons under the old system. In some cases, Messrs. Galloway inlroduce a series of vertical tubes between the upper and lower surfaces of the black flue, which it is said to considerably increase the duty of the boiler.—*Mining Journal.*

Royal Institution

Mr. Farady's fourth lecture on Static Electricity was delivered on Saturday, to a very crowded audience. The curious property and phenomena of induced electricity formed the principal subject of the discourse, which was illustrated with a great variety of well-contrived and curious experiments. In the first place he exhibited the simple phenomenon of induction, by showing the action of an excited glass rod at a distance from the electrometer, and its power of communicating electricity to an insulated brass cylinder without touching it, and by that means setting fire to gas. The induction of electricity in these instances takes place through the air, which is a non-conductor, and the power increases when more perfect and solid non-conductors are used, as was exhibited by interposing a great thickness of sulphur and shellac between the electric fluid and the ellectrometer. The more perfect insulators transmit induced electricity with greater facility than imperfect ones; and it has been ascertained that sulphur is 2¼ and shellac 2¼ more effective than air in transmitting induced electricity. The power which one electrified body possesses in inducing electricity in all other bodies has no known limit, and may be supposed to extend through infinite space, though the intensity diminishes in a greater ratio than the distance. As an illustration of the extended influence of induction, a large metal globe was suspended at a considerable height in the lecture room, and having been charged with electricity, the extent of its influence was shown by collecting electricity, by holding a small piece of insulated gold paper towards it, by which means sufficient electricity was collected to divergo the leaves of the electrometer. The charged metal globe, Mr. Faraday said, might be considered as a small thunder cloud; and in a subsequent lecture, when treating of atmospherical electricity, be should have to remark on the impottant effects of induction on the large scale. A very remarkable characteristic of static electricity is, that one kind of electricity cannot be excited without the other kind, and this is peculiarly manifest in e'ectrical induction. When an excited glass rod is held near to any bod y, the glass being positively electrified, induces negative electricity in that part of the body nearest to it, and positive electricity in the part most remote. If the body be insulated, and the positive electricity be drawn off by a momentary connection wi h the earth, it is left in a negative state when the glass rod is withdrawn. For the purpose of showing that when electricity is induced in metals they convey it along their surfaces only, and that the inside of a metallic vessel contains no electrcity, an ice pail was electrified, and though the outside gave abundant evidence of electricity, a metal ball lowered inside to the bottom did not effect the electrometer. A white mouse was enclosed in a wire gauze cage, and being placed on an insulated stand, and connected with the electrical machine, very powerful sparks were taken from all parts of the gauze without disturbing the mouse, which seemed quite unconscious of minature lightning storm around it. As a further illustration of this curious property, several brass pillars were arranged in a circular form an a insulated metal stand, and though there was the space of half-an-inch between each pillar, the interior of the skeleton cylinder gave no trace of electricity, which emitted in strong sparks from the outside of the rods. Induction affords an explanation of the apparent repulsion of bodies similarly electrified. Some strips of paper, on being held together at one end, started far apart when in connection with the prime conductor of the machine, as if repulsive power acted on each strip, and when both ends were fastened the strips distended in the middle like a balloon. This apparent repulsion was, however, shown to be entirely due to the attractive power induced in surrounding bodies, for when the balloon was partially enclosed by the hands, the stronger attraction caused by increased proximity, caused it to distend with much greater energy. As electricity is induced through the intervening substance of a non-conductor, the inside of a vessel made of shellac or glass will contain electricity as well as the outer snrface, in which respect non-conductors differ essentially from metallic substances. The same principle on which Mr. Faraday explained the cause of metallic vessels not containing electricity, he also applied to explain the cause of electricity being much more readily emitted from angles and small ball than from large balls and flat surfaces; but this part of the subject was hurried at the conclusion, and was not made so clear as Mr. Faraday's illustrations generally are.—*London Mining Journal.*

English Patents.

Manufacture of Steel.

This invention relates to the process of refining the metal, and forcing currents of atmospheric and gaseous air during the process so as to convert it into steel; and also to prepare the metal previous to submitting it to the process of conversion into steel.

The apparatus consists of the converting furnace, to the tuyere whereof a blast pipe is attached, formed into three passages, provided with valves for regulating the air currents. Two of the passages communicate with two iron receptacles in front of the converting furnace—the centre passage passing between them and to the front of the receptacles.—These receptacles are provided with gratings and ash pits beneath, and with covers for closing them.

The process of converting the metal into steel by this apparatus, consists in allowing the air to pass into the two passages of the blast pipe communicating with the receptacles, such receptacles being filled with charcoal, which is then ignited, and the receptacles closed by means of the covers; the air thus passed through the receptacles is formed into carbonic oxide, and enters the tuyere of the converting furnace, where it is mixed with such a quantity of atmospheric air from the centre passage, as may be judged desirable, though the patentee states that a large quantity should generally be avoided. By means of the valves, the quantity of gaseous or atmospheric air can be regulated by the operator. To prepare the metal for the process of conversion, the patentee states, that if it be pig iron, it is to be smelted sufficiently in a cupola furnace, to which is applied the apparatus above described; but if it be wrought iron, a plumbago crucible is used, in which the metal is to be placed, being properly stratified with charcoal or carbonaceous material. *Practical Mechanics Journal.*

New Mode of Treating Oxides of Iron.

This improvement relates to treating the oxides of iron for obtaining a black or dark colored pigment, or a volatile oleaginous product, or an inflammable gas. The oxide of iron is finely pulverised and mixed with carbonaceous matters. The proportions vary considerably—the addition of 10 per cent. of carbonaceous matter is generally sufficient; but the patentee prefers a little excess of carbonaceous matter, and mixes the oxide of iron with from 12 to 15 per cent. of carbonaceous matters, or such a quantity that, when the process is complete, a slight excess of carbonaceous matter will remain in the retort unimployed. Any kind of carbonaceous matters, which are not too volatile or expensive, and which can be mixed intimately with the oxide of iron, may be used; but when not in a fluid state, they must be pulverised. Those preferred are resin and tar. When resin is used, it must be pulverised, and the oxide of iron mixed therewith in a dry state. When tar is employed, the oxide of iron is mixed therewith in a moist state, for the purposs of facilitating the incorporation of the materials; and the mixture is dried at a temperature sufficiently high to deprive it of nearly the whole of its moisture, and reduce it to a state of powder.

The mixture is to be put into retorts or close vessels; and the patentee prefers to use cast iron retorts, of the ordinary kind, five feet in length, and one foot in diameter, with a cover, to be fastened on the open end, and a ring at the opposite end for the purpose of lifting it. A retort of this size may be charged with 1 1-2 cwt. of the mixture; and then, the cover being secured, it is lifted by a crane, and placed in a suitable furnace, in a vertical position, with the cover end downwards, in order that the volatile products evolved from the mixture may be consumed, and thus aid in heating the retort. The heat is to be gradually raised until the whole of the retort has arrived at a low red heat: at which temperature it must be kept until about two hours after the evolution of the combustible volatile products has ceased; and then, the process being complete, the retort is removed from the furnace, and allowed to become cold, or nearly so, before the charge is withdrawn—as it would be injured by contact with the air while hot. The material produced will be black, or dark colored, and will form a good pigment for many purposes. Some carbonaceous matters, when used in the production of this material, will cause it to be sufficiently pulverulent; but when this is not the case it must be ground and pulverised; the pulverised matter is to be ground with oil, so as to form paint in the usual way. When the combustible volatile products of the calcination are not burnt, the cover on the retort is luted, so as to make it air tight, and a pipe inserted therein to convey the volatile products to a condenser. The calcination will cause a volatile oil to be evolved from the contents of the retort, and the oil will pass through the pipe into the condenser, where it will be condensed. The calcination will also cause the evolution of an inflammable gas, suitable for the purpose of illumination;—which gas must be conveyed by a pipe from the condenser to a gasometer.

The claim is for treating oxides of iron by mixing them with carbonaceous matters and subjecting them to the action of heat in the manner above described, for the purpose of obtaining one or more of the several products before mentioned. — *Practical Mechanics Jonrnal.*

Railway Share List,

ON A PAR OF $100 ACCORDING TO THE LATEST SALES.—CORRECTED EVERY WEDNESDAY.

NAME OF COMPANY.	Length of line.	Length of branches.	Miles finished.	Cost of road and equipment.	Cost per mile.	Capital st'k paid in.	Debts more than surplus.	Ruling grade.	Earnings 1848.	Expenses 1848.	Net earnings 1848.	Rate of dividend in 1848.	Price of shares.	Remarks.
Atlantic and St. Lawrence	146	....	36	In progress.				..					78 a 81	
Androscoggin & Kenneb.	55	....	6	In progress.				..					70	
Albany and Schenectady.	16⅞	....	16⅞	$1,606,196	100,000			..				1 5-9	89	
Auburn and Rochester...	78	....	78	2,644,520	34,000			..	175,922			8	86a87	
Auburn and Syracuse....	26	....	26	1,125,886	43,300			..	454,721			2 9-10	80a81	
Attica and Buffalo.	31½	....	31¼	821,313	26,000			..	172,185			4¼		
Alleghany Portage	36	....	36					..	150,959				Leas'd to	
Albany and W. Stockb...	38¼	....	38¼	1,924,701	50,000			..					Western	
Annapolis and Elkridge..	21	....	21					..					railroad.	
Bangor and Oldtown	11¾	....	11¾					..						
Boston and Lowell	25½	1¾	27¼	2,013,687	73,200	1,800,000		10 up, 30 down.	461,339	268,707	192,631	8	118¾	
Boston and Maine.	74¼	5	79¼	3,571,832	45,000	3,249,804	249,715	47½	511,627	264,534	247,893	8½	102¼	
Boston and Worcester...	41¾	22	66¾	4,960,000	74,700	4,500,000	460,000	40	716,284	406,303	310,080	8½	102¾	
Boston and Providence...	41	6½	47½	3,031,106	63,800	2,893,300	26,878	37½	354,375	183,361	170,013	6½	92¾	
Bost., Concord and Mont.	90	....	38	In progress.				..					82a85	
Berkshire	21	....	21	600,000	28,500			..				7		
Buffalo and Niagara	22	....	22	250,396	11,500			..	60,014			6 1-3		
Buffalo and Black Rock.	3	....	3					..						
Baltimore and Susqueh'a.	36	....	36					..						
Beaver Meadow	26	....	26					..						
Buck Mountain		....	4					..						
Baltimore and Ohio...	....	....	178											
Washington Branch.	....	....	31	13,136,940	61,900			..	1,468,828	805,530	663,198		43¾a44	
Frederick Branch...	....	....	3											
Calais and Baring	3	....	3					..						
Concord	34	....	34			1,350,000		..	311,326	180,699	130,639		121	
Cheshire	54	....	54	2,584,143	48,000	1,453,379	1,140,764	60					67a67½	
Connecticut and Passump.	115	....	40					..					85	
Connecticut River	50	2	52	1,588 184	30,500	1,234,970	426,013	32	165,242	95,658	69,583	8	96¼	
Cape Cod Branch.	28	....	28	587,116	20,900	343,000	217,395	40					62	
Corning and Blossburgh..		....	40					..	18,069					
Cayuga and Susquehanna	29	....	29					..						
Camden and Amboy...	61													
Trenton Branch.	6¼	..	96¼	3,200,000	33,000			..					140 a 142	
New Brunswick Br..	29													
Columbia	82	....	82					..						
Camden and Woodbury..	9	....	9					..						
Cumberland Valley		....	52					..						
Carbondale & Honesdale.	26	....	26					..						
Chesterfield	12	....	12	150,000	13,500			..						
City Point	9¼	....	9¼	195,867	15,919			..						
Central of Georgia	191	....	191	3,222,289	16,800			30	516,252	266,450	250,226		80	
Central of New Jersey...	63	....	36					..						
Dorchester and Milton...	3¼	....	3¼	114,224	35,100	72,990	41,234	39					74	
Detroit and Pontiac	25	....	25					..						
Eastern	54	19¾	73¾					40				8	100a101	
Essex (Salem to Law.)...	22½	....	22½	421,574	18,700	263,746	160,958	55						
Erie and Kalamazoo	33	....	33					..						
Fall River	42	....	42	1,145,982	27,300	1,050,000	83,177	45	184,344	109,390	74,953	7½	85	
itchburgh	49¼	6¼	56	2,945,630	52,300	2,735,910	67,504	..	486,265	286,046	200,219	8½	110¼	
Franklin		....	22					..						
Greensville and Roanoke.	21	....	21	283,917	13,500			..						
Germantown Branch	6	....	6					..					88 a 90	
Gaston and Raleigh	96	....	96					..						
Georgia (Augusta to At'a)	171	....						40	477,052	267,173	209,879		121	
Athens Branch	....	39	210					..						
Harrisburg and Lancaster	37	....	37	1,183,257	31,979	609,550	573,707	49	121,350	37,386	83,963	6	96 a 97	
Hartford and New Haven	62	....	62					17					104 a 105	
Housatonic	74	....	74					..					87	
Hudson and Berkshire...	31½	....	31½	818,983	26,500			..						
Hazleton and Lehigh	10	....	10					..						
Jackson and Brandon	13	....	13					..						
Lexington and W. Camb.	6½	....	6½	252,680	38,900			55						
Lowell and Lawrence	12½	....	12½	283,248	22,650			45					85	
Long Island	98¼	....	98¼	2,173,646	22,100			..					23½	
Lockport and Niagara...	23	....	23	221,000	9.700			..						
Lewiston	3¼	....	3¼	33,673	10,300			..						
Lykens Valley	16	....	16					..						
Little Schuylkill	23	....	23					..						
Louisa	50	....	50	474,137	9,482			..						
Lexington and Frankfort.	29	....	29	450,000	15,600	300,000		61	50,000	30,000	10,000		82a85	
Little Miami	84	....	84	1,513,402	18,000			..						
Machiasport	8	....	8					..						
Morris and Essex		....	45					80					100	
Mauch Chunk and R. Run	36	....	36					..						
Mine Hill & Sch. Haven.	25	....	25					..						
Mount Carbon	7	....	7					..					136	
Mt. Carbon & Pt. Carbon	2½	....	2½					..						
Mill Creek	6	....	6					..						
Montgomery & W. Point	67	....	67					..						

Railway Share List,

ON A PAR OF $100 ACCORDING TO THE LATEST SALES.—CORRECTED EVERY WEDNESDAY.

NAME OF COMPANY.	Length of line.	Length of branches.	Miles finished.	Cost of road and equipment.	Cost per mile.	Capital st'k paid in.	Debts more than surplus.	Ruling grade.	Earnings 1848.	Expenses 1848.	Net earnings 1848.	Rate of dividend in 1848.	Price of shares.	Remarks.
Madison and Indianapolis	86		86										110	
Mad River and Lake Erie	102		102											
Mansfield and Sandusky			56	$1,106,121	19,700									
Michigan Central			221											
Michigan Southern			70											
Tecumseh Branch	10													
Macon and Western			101	328,091	6,218			30	140,970	63,243	78,722		48a48½	
Mississippi			30											
Nashua and Lowell			14½	525,063	36,200	525,000		13	169,187	109,599	59,588	10		
Northern (Ogdensburg)			12	In progres	s.									
" (Concord to Leb'n.)	69¼	}		2,762,500	34,000		129,978		408,455	241,370	167,277		75¾	
Bristol Branch	12½	}	81¼											
N. Bedford and Taunton			20	499,065	24,998	400,000		40	136,151	96,220	39,225	6		
Norfolk County			26	621,488	23,900	414,256		35					33a34	
N.Y. & N. Haven (14 mls.	Har	RR)	62										90a91½	
New Haven Canal			28											
Norwich and Worcester	59	7	66	2,187,829	33,100			32	218,073	170,297			36	
New York and Harlem			80¼	3,579,567	44,600								54¼	
New York and Erie			200										60¾	
New Jersey			29										108 a 110	
Newcastle & Frenchtown			17											
N. Orleans and Carrollton			5½											
Old Colony	37¼	7¾	45	2,080,903	46,200	1,601,415	683,648	40	227,350	139,592	87,757	6½	78	
Oswego and Syracuse			41											
Portland, Ports. and Saco	51		51	1,350,000	26,400							6	95	
Peterboro' and Shirley	12		12	208,311	17,300									
Pittsfield and N. Adams	18¾		18¾	447,755	24,000			66						
Providence and Worcester	43½		43½	1,873,895	43,000		573,058	26	193,844	83,889	109,954		82½	
Paterson and Hudson R.	16½		16½										110a111	
Philadelphia and Trenton	28		28									10	130 a 140	
Philad. Wilm. and Balt.	97		97	6,173,851	66,000				638,142	382,608			54	
Philadelphia City	6		6											
Philad. Germ. and Nor.	17		17											
Philadelphia and Reading	93		93										35½	
Penn Township	2		2											
Petersburg	59		59	946,361	16,040				163,092	87,131				
Ponchartrain	4½		4½											
Pt. Hud., Jack. and Clint.	28		28											
Rensselaer and Saratoga	25		25	661,910	26,400									
Ramapo and Patterson	15													
Rich. Fred. and Potomac	75¾		75¾	1,474,004	19,459				206,858	100,568				
Richmond and Petersburg	22		22	877,484	39,886									
Sullivan	28		28											
South Shore	11½		11½	255,748	22,200	135,935	128,075	35					33½	
Stony Brook	13		13	246,659	19,000	216,829	29,189	40						
Stonington	50		50										54	
Sarataga and Washington	40		40	948,372	23,700									
Syracuse and Utica	53		53	1,968,036	37,060				677,671				120 a 121	
Schenectady and Troy	20½		20½	659,668	32,100				47,025					
Saratoga and Schenectady	22		22	331,036	15,000				57,018					
Summit	2		2											
Schuylkill Valley	14		14											
Shamokin	22		22											
Swatara	4		4											
Seabord and Roanoke			76½	1,519,140	20,460									
S. Carolina Main Stem }	136													
Columbia Branch }		68¼	242	5,943,678	24,500				800,073	308,802	401,271			
Camden Branch }		37¼												
Sangamon and Morgan	56		26											
Taunton Branch			11	305,085	27,600	250,000		35	108,101	90,485	17,615			
Tonawanda	43½		43½	974,865	22,400				218,301					
Troy and Greenbush	6		6	273,625	45,900				60,055					
Tuckahoe & James River	4¾		4¾	69,322	14,999									
Tallahasse and Port L.			26											
Tuscumbia and Decatur			44											
Utica and Schenectady	78		78	3,161,688	40,500				795,239			10	123a125	
Vermont and Mass	69		69					55					40a41	
Vermont Central	121		69	In progres	s.								47½	
Vicksburg and Clinton			46										7¾	
Western	117¾		117¾	7,975,452	67,700			83	1,332,068			8	102a103	
West Stockbridge	2¾		2¾	41,515	15,000									
Worcester and Nashua	45		45					48					50a51½	
Wrightsv, York & Gettys.			13											
Whitehaven and Wilkes.			20											
Williamsport and Elmira			26											
Westchester Branch			10											
West Feliciana			24											
Winchester and Potomac			32	509,415	15,919									
Wilmington and Weldon			163											
Westminister Branch			10											
Western and Atlantic			100	In progres	s.									
York and Maryland Line			21											

AMERICAN RAILROAD JOURNAL.

Saturday, July 14, 1849.

Railways---American and English.

In the United States and England only, have rail roads, from the amount of capital invested in them, taken rank among the leading monetary interests, and consequently furnish the best illustrations of the influence they are calculated to exert on the capital and business of a community in which they exist. The experience of their operation in these two countries has been widely different—with us, their action has been in harmony with the business of the country, has been promotive of general prosperity, and they stand high in popular favor. In England on the contrary their construction has been followed with most disastrous results; and from occupying the highest place in public confidence, they are now regarded with universal distrust. An examination of the causes of these widely different results may teach us a useful lesson, and enable us to avoid the disasters that have overwhelmed this kind of property in England.

In looking into the systems of the two countries, we are struck at the outset with the great disproportion in the cost of their respective roads. At the present time we have about 6,750 miles of road in operation in this country, at an estimated cost of 30,000 per mile, making an aggregate cost of $202,-500,000. In the United Kingdom there are about 4,600 miles in operation at a cost of about $150,000 per mile, at an aggregate cost of about $690,000,000. Labor and iron, under which terms are embraced nearly the whole cost of a road in this country, are much cheaper there than they are here. In fact our roads are built with English labor and iron. We have to pay what these cost there with the additional charge of transportation. On the other hand, the English roads have a double track, while ours, with a few exceptions, have but one. The gradients of their roads are much less than of ours, consequently the amount of excavation required is much greater. The land necessary for track, station houses, and depots costs a vast sum, while in this country it is either given gratuously or costs but little, compared with the whole cost of the road. Their roads are much more thoroughly built than ours, and all the structures connected with them are of the most durable kind. In England vast sums are undoubtedly wasted in the finish and ornament given to their roads, that might without any real detriment, have been saved; while on the other hand we lose largely from the imperfect manner in which some of our roads are built, which renders them almost worthless when they are considered as finished.

But what chiefly distinguishes American from English roads are the objects in view in their construction. As a general rule, the stock to our roads is not subscribed for investment. They are regarded as public works, constructed to accommodate the wants of a peculiar section, or enlarge the business of some town, upon the same principle that any ordinary road is built. The great advantages resulting from them is not measured so much by the dividends they pay, as by the enhanced value they give to the property of the sections through which they run, and in the town in which they terminate. In this country all our markets are on the seaboard, and produce one hundred miles distant may be nearly worthless for want of suitable means to bring it to market. A farmer can well afford therefore to lose a few hundred dollars in railroad stock for the sake of a cheap and easy means of forwarding his products. The same holds good in regard to cities. An expenditure of a million of dollars in a road frequently adds five times that sum to the value of the real estate in the town in which it terminates. And as the ownership of real estate is nearly as general as that of personal property, every person among us is directly interested in the encouragement of railroads, and when one is projected this feeling for their utility, forces every person to contribute something in proportion to the extent he expects to be benefitted. Every man is called upon to do what he can. Those whose property is nearest the road, and consequently receive the greatest advantage from it, are either expected to give it the right of way, or sell their land for this, and for depots and station houses at a very low rate. If, after all, associated strength is not able to accomplish the work, corporate bodies, such as cities and towns, and very often states themselves are called upon to lend their credit to finish it.

Such are the great objects of railroads in this country, and such are the means to which we are compelled in most cases to resort to secure their construction. Those persons who are most interested in their success, are usually entrusted with their construction and management. They are actuated and controlled by the same sentiments that pervades the community. Where the most strict economy is requisite to success, each step they take is watched and criticised by every person interested. In no other state of things can such accountability be secured. The motives brought to bear upon the Directors, and the careful scrutiny exercised by the whole community over all their acts, are the best pledges that can be given for the honest discharge of their duties. They may make mistakes, but they will not sacrifice the interests of the roads for selfish purposes.

English roads, on the other hand, are undertaken upon the same principle that a ship is built, for income to be derived from the business they are to do. Both are the instruments of commerce which, in fact, gives them all their value;—but they are built, not to create a commerce, but to act as the agents of one already existing. Those who contributed towards the construction of English roads were probably in the main indifferent to the influence they exerted upon the business and property of the country. There exists in that country a very numerous class, of which we have fortunately no representatives here, of persons, who, without labor, live upon the stated income of a fund set apart for this purpose; of annuitants, of half pay officers, widows of military men, and spinsters, for whom some relative has made scanty provision, of men who are in the easy enjoyment of sinecures created by a corrupt government, and sanctioned by time, who, being removed above the necessity of labor, are incapacitated from education and habit of supporting themselves by their own exertions. During the mania in railways, these persons in common with the whole community, supposed that by converting their property into railway stock, they could double their income; and under this idea, their investments, which were paying but a moderate income, were transferred into railway stock.

A road might vastly increase the value of the real estate of a particular section, and yet they be made none the richer. This indirect influence was not the inducement to their subscription. In England real estate is held in a few hands. A man may be possessed of large personal property, without owning lands. In the United States almost every person in the agricultural district is a landholder, though he may have but little personal estate.—The English agriculturist has but little interest in railroads, compared with the American farmer.—The former has a constant market in the numerous large towns that cover that island. Consequently, those interested in roads there bear but a small proportion to the number interested in them here. The Directors of English roads are actuated by entirely different motives from the Americn Directors.—Having but a slight interest in the results of the road, they are more open to the temptation to make money out of their position, either by speculating in its stocks, or by being interested in the construction contracts, or by selling their influence to carry out the selfish schemes of others. The value of the stock they own may be insignificant compared with the opportunity their position gives them to make money out of the road, in some of the ways stated. They were not looked after and watched by every man in the community, who felt that unless the pittance he contributed was properly applied, the work could not be completed. The consequence of all this has been, that in England the great object of the Directors on many of the lines has been to enrich themselves out of the road. Every species of fraudulent management has been practiced in the construction of their roads. After they were completed and their stocks went into the market, their prices were raised or lowered by false entries of amount of earnings, to suit the purposes of a speculator, who could control the directorship. But all these frauds necessarily had an end. Stockholders were at last aroused to the necessity of looking into the conduct of their directors, and taking the management of affairs into their own hands; but not till after the capital of many of their road had been wasted, and 4 or 5,000,000 of dollars had been irretrievably lost, carrying with it an amount of suffering, of which in this country we have no conception. If we have escaped these disasters, it has been owing to the different condition of things in this country, and not to any difference in the principle by which human nature is controlled.—The moment that Directors cease to have an interest in the results of the road, as a public work, we lose one of the strongest guarantees for the faithful discharge of their trusts. Our only safety then consists in constantly subjecting those who have the management of a road to the influence of the same motives, brought to bear upon them in its construction. The moment we fail to do this, we shall be in the direct road to the same state of things that we now witness in England.

To allow speculators to control the management of a road, is as fatal to its character as the touch of a libertine is to virtue. A formidable party is at once raised up all whose efforts are directed to bring the road into disgrace. The antagonistical one, though it may be interested to keep up the price of its stock, is not actuated by any greater friendship for the road than its rival. Both are equally indifferent as to advancing its true interests. The stock becomes the dice of gamblers, and then the more its real condition is veiled in mystery, the better is it adapted to their purposes. We regret that all of our roads in this country have not escaped the dangers we have pointed out; roads not only of great public utility, but which should have yielded a profitable return upon the capital invested in their construction. New York has been particularly unfortunate in this respect. We propose in another number to point out in a more particular manner the causes of failure which have so signalised all her attempts at railway construction.

Railroad to the Pacific.

As the author of a distinct plan, Mr. Whitney occupies the most prominent place before the public. No man among us has given the subject so much attention. He tells us that he has exclusively devoted the last seven years to this work, and as we believe he has no other object in view but the success of this work and the good that will result from it, his views are certainly entitled to great respect and attention. His project has received the favorable consideration of a majority of the states, and should he fail in carrying out his own scheme, he will certainly enjoy the satisfaction of having done more to bring this subject before the public mind than any man in the country.

Mr. Whitney asks government to sell him a belt of land sixty miles in width, extending from Lake Michigan to the Pacific Ocean, at ten cents per acre; in consideration for which and the low price to be paid, he proposes to build a railroad between these points; that the road so built, shall only charge sufficient to keep the same in repair, or if improperly managed by him, not only its management but the road itself shall vest in government. If government will make this grant, he offers to take the entire responsibility of its construction upon himself, and obtain the means from the sale of the land so granted. As an inducement to this grant he argues that this road if built, in addition to the advantages it would confer on us by opening a communication between the two extremes of our country, would become the great thoroughfare for the trade of the world. That not only the commerce of the United States with Asia, but that of all Europe would follow this route in preference to all others, and that it would place us in a position in which we might enrich ourselves at the expense of the rest of the world.

We propose to discuss—

1st. The practicability of his scheme.
2d. Can it be executed by him?
3d. Will it secure the results predicated?

To show more in detail his plan, we give it to our readers in his own words, copied from the work referred to:

"The entire length of the road from Lake Michigan to the Pacific Ocean, allowing 250 miles for detour or windings, would be 2,030 miles.

It is estimated that, on the proposed plan, it would cost to construct the road, as the annexed bill (No.4) provides, with a heavy rail of sixty-four pounds to the yard, and on a guage or width of road not less than six feet, $20,000 per mile, amounting to	$40,600,000
And it is estimated that it will cost for machinery, for repairs and expenses of operation while the road is being construc'ed, and before its earn ings can provide for itself	20,000,000
Making the total cost ready for use	$60,600,000

I ask of Congress to set apart and sell (not grant) to me sixty miles in width of the public lands, from Lake Michigan to the Pacific Ocean, in all, good, bad, and indifferent, 77,952,000 acres, at a reduced price, fixed by the committees in Congress at ten cents per acre.

To the estimated cost of the road of	$60,600,000
Add ten cents per acre to be paid into the United States Treasury for the 77,952,000 acres	7,795,2000
Total	$68,395,200

Now it will be seen that this 77,952,000 acres of waste wilderness lands must be made to produce the sum of $68,395,200, equal to 87¾ cents per acre for all, or the work cannot be accomplished, and which sum is ten times as much as these very lands could ever be made to produce, and this can be done only by connecting the sale and the settlement of the lands with the work itself; the road creating facilities for settlement, and the settlement producing the means in labor and money to build the road.

Of this 2,030 miles, 800 miles of the first part, say from the lake onward, the land is of the very best quality for the production of food for man; the surface beautiful, without rock or mountain, or even hill; just enough rolling and descending to let the water off, and well watered with living streams every ten to twenty miles, and all covered with a rich grass, ready for grazing or for harvest, enough for millions of cattle, no preparations required for a crop—the farmer wants but the plough, the seed, the sythe, and the sickle. 500 miles of this 800 is without timber, and 150 miles with but a small amount—not enough for agricultural purposes, (buildings and fences) should the country become settled. Beyond this 800 miles, and to the Pass in the mountains, a great part of the land is represented as too poor to sustain settlement; but I am inclined to believe that the facilities which the road would undoubtedly create, must make a part of it productive and useful.

From "the South Pass" to the Pacific, I am disposed to believe, from information procured, that there is more land suitable for culture and grazing than has been inferred from different writers.

Of the entire route, 1,200 miles is without timber, even sufficient for the construction of the road, though with an abundance of coal; a great part of the distance is *without stone or material for such a work* or for the settlement of the country; and the road must be the only means of transit, as it would progress, for its own material, as well as for the material for buildings and fences, for the settlement of 1200 miles of the route.

We will now proceed to an explanation of the plan or mode of operation by which it is proposed to carry out and accomplish this great work. As before stated, the bill sets apart and sells to me 60 miles wide of the public land from the lake to the Pacific, and an equal number of acres for any already sold, expressly for this work; and as before stated, the 800 miles of the first part, the good lands must be made to produce means to construct 1,600 miles of road, (800 miles though poor lands) or one mile by 60 being 38,400 acres, must furnish means for two miles of road. I should, immediately after the bill becomes a law, survey and locate the route for 200 or 300 miles so as to secure the lands; then make a contract for the grading of 100 or 200 miles of the road, and make all arrangements and preparations, with machinery, to go on with the work; and when, having completed 10 miles of road, as the bill provides, on the best plan of construction of railroads of the present day, on a guage of not less than six feet wide, and with an iron rail of not less than sixty-four pounds to the yard, all to the full satisfaction of the commissioner or government and to his satisfaction that the work was being continued with a prospect of success, then, under the certificate of the commissioner, I should be allowed to sell 5 miles by 60, the one-half through which the road has been completed, or 192,000 acres; which, at the present price (72 cents per acre) for soldiers' bounties, and which must be the price of the best lands until some 16,000,000 of acres are disposed of, would amount to $138,240. Now such a road as the bill calls for cannot be built short of $20,000 per mile, and the ten miles would cost $200,000, for which outlay I should receive lands which can now be purchased for $138,240, or $61,760 less than my actual outlay; the government holding the other half, (5 miles by 60) 192,000, through which the road had been built, and also holding the road. Now if I could not make this 192,000 acres produce enough to return the $200,000 expended on the 10 miles of road, then the work could not be continued, and the government would not allow me to take one acre of land, and I should have sunken the $200,000, and as much more as had been expended in the experiment. But if from the results of my energies, efforts, and labor, I raise from its present value of $138,400, the 192,000 acres to or beyond the $200,000 expended, then the work could be continued, and the 192,000 acres and other half held by the government, would have imparted to it an equal increase in value from the same causes. Such would be the case or proceeding for 800 miles through the good or available lands, or so far as the 5 miles by 60, or 192,000 acres would furnish means to construct the 10 miles of road, the government always holding one-half (alternate 5 miles by 60) and all the lands, and also holding the road as security for all; each and every ten miles being always completed in advance of my being allowed to take any lands.

Can this road be built for $20,000 per mile? If not, then there is an end to Mr. Whitney's scheme, as the lands asked for are to defray its whole cost. Mr. Whitney gives us no data why the sum of $20,000 per mile was fixed upon as its cost. The New England roads cost on an average about $50,000 per mile. Here labor, skill, materials of all kinds, and trustworthy agents, all the elements of cheap roads exist in greater abundance than in any other part of the country. All these Mr. Whitney must transport to the line of his road, and they must cost him vastly more than the same service and material in the Eastern States. The grading of the road proposed by Mr. Whitney may cost something less than the average of New England roads. This is the only item in his favor. From the high northern latitude of the route proposed, his road will require the same amount of ballasting as the Eastern roads. The cost of bridging must be vastly greater. The Mississippi and Missouri rivers are to be spanned by structures above the reach of steamboats navigating these waters; works, which in the older states, with all the necessities that exist for them, and all the means at command, neither states nor individuals have yet had the hardihood to attempt.—The road, until it crosses the Missouri, runs at right angles to the water courses; and it is one of the peculiar features of the west, that their rivers, though frequently of great length, water but a small extent of territory;—and are separated from each other only by narrow ridges of land. Every few miles, the road would encounter rivers, which, tho' usually discharging but a small volume of water, are of great magnitude when swollen by rains or melting of snows. If Mr. Whitney had equal facilities on his route, as far as labor and materials are concerned, as are possessed in New England, we do not think that he could construct his road at less cost than theirs. Such we feel confident would be the opinion of of any experienced engineer. Unless he can do this his scheme is impracticable.

Mr. Whitney is guided in the selection of his route by the fact, that the first part of it runs thro' timbered lands. These lands, he says, must furnish timber for the whole route, or at any rate for the first sixteen hundred miles. He claims that all other routes are impracticable, in not possessing this important condition. Now it is notorious that a large portion of the northern part of Illinois and the southern part of Wisconsin is prairie; and that the timbered lands, which, as a general rule, are confined to the water courses, have been taken up by settlers. The same is the case for a great distance west of the Mississippi. We have no doubt that before Mr. Whitney could locate his road the whole, or nearly the whole of the timbered lands on the line of his route will have become the property of settlers. This will compell him to purchase all the timber necessary for his work at a high price, from its great scarcity. On the line of his route too, a great portion of the good lands for some hundreds of miles have been, or will be sold before he can commence. As he cannot sell the lands on the route only so fast as he progresses with his road, he will be compelled to resort to the reserved lands in the other states, which will derive no additional value from the construction of the road.—For the distance therefore that the lands on his route are sold, he cannot, as he proposes, build the

road by the labor of colonists in exchange for lands along its line. So far he has no advantages over any individual or company who should undertake to build the road by private means.

But suppose Mr. Whitney reaches the lands still held by the government, and that can be made available to his purposes. He then proposes to build the road by labor of settlers, given in exchange for lands. In relation to this he says:

"It is proposed to establish an entirely new system of settlement, on which the hopes for success are based, and on which all depend. The settler on the line of the road would, so soon as his house or cabin were up, and a crop in, find employment to grade the road; the next season, when his crop would have ripened, there would be a market at his door. So that in one year the settler would have his home with settlement and civilization surrounding, a demand for his labor, a market at his door for his produce, a railroad to communicate with civilization and markets, without having cost one dollar. And the settler who might not have means in money to purchase land, his labor on the road, and a first crop would give him that means, and he too would in one year have his home with the same advantages and as equally independent."

This involvs the necessity of Mr. Whitney's undertaking the construction of the road himself, and not through the agency of contractors, as is always the case in works of a similar kind. The great object of employing contractors is to interpose between the company and the laborer, competent men, who have a direct interest in seeing that every laborer employed shall perform the work expected of him. These men give companies a guaranty that a certain amount of work shall be performed for a stipulated sum, and competition is sure to reduce the amount to be paid to the lowest living point.—A contractor undertakes only so much work as can be performed under his own eye. A large number of persons are distributed along the line of a road, who have, in fact, a much more direct interest than the company itself in the progress of the work. The reason why companies by employing their own men themselves, cannot build a road at even double the cost that contractors can, is, that they have none to represent their interests among the persons employed, who act only upon the motive of getting the most money for the least work. Mr. Whitney will find himself in the same situation. He cannot build the road himself at double the cost of a fair estimate.

But we will suppose that he has surmounted all these difficulties; that he has conducted his road through the wooded section bordering on Lake Michigan and the Mississippi; and that he stands on the confines of the boundless prairies of the west.—From this point he must carry with him not only his laborers and provisions, but every material.

A simple statement of these difficulties to be encountered seems to us sufficient to appall any man, however ardent and enthusiastic he might be. This railroad is to preclude all common roads. How much will it cost to deliver along the first ten miles of its line, without even the aid of an ordinary road, the provisions for the operatives, lumber for their houses, timber and iron for the road, and timber and stone for bridges. The rivers of the west run over clayey and sandy beds. The bridges over them must be enormously expensive, requiring heavy stone abutments and piers, sunk below the action of the water and frost. Mr. Whitney admits that 1200 miles of the route furnishes no materials for this work. Where is he to get the stone for bridging every water course he encounters? This he will often be obliged to drag over the soft soil of the prairies, almost impassible in rainy seasons, for a distance of ten miles. After he has proceeded 1200 miles he will be compelled to return to the point of starting for every article that goes into the construction of the road. The transportation of these articles this distance, at the same rate as on the New England road,s will cost $20 50 per ton, equal to about one-half of the cost delivered in this country, of English rails. At the same rate the transportation of a cubic yard of stone would cost $41. No public work has ever yet been undertaken involving such difficulties as these.

To be Continued.

Railway Economics--Permanent Way.

Permanent way, whether it be regarded as to its immense first cost, its expensive annual maintenance, or its rapid final decay, is a question of the first importance to the progress of locomotion. The want of active association amongst civil engineers in the United States is a very serious misfortune to the country; and in order therefore to collect all the information scattered through the members of the profession on this all-important subject, we beg leave to invite them earnestly to make this Journal the medium of communicating to each other the particulars of their experience on permanent way. Hoping that others will follow, we will ourselves begin the work by throwing out for candid, friendly discussion such suggestions of our own as strike us worth the consideration of the profession. In reference to any thoughts that may from time to time occur to us on this or any other question, we take leave here once for all to state that no foolish fondness for our own idea shall enter into our discussion of them with others; and that considering all questions arising in the progress of mechanical science as strictly abstract things apart from any petty interest or paltry selfishness, we will ourselves in turn canvass the thoughts of others to the best of our ability in all honesty and candor.

The platform of a railway is of three kinds—the cross-sleeper; the longitudinal bearer; the sleeper and bearer combined. The first is open to the objection that sinking into the permanent way, it requires constant "packing;" and also that affording a support only at certain intervals, it involves a greater vertical strength and side-stiffness in the rail. The longitudinal bearer, though for a long time in use on the Great Western railway in England, has not been brought so much as the sleeper under the observation of engineers generally; but the objections to which it seems open are chiefly that, presenting less surface to the permanent way it is more liable to sink; that crossing the drainage of the road it retains water to an extent that quickens its decay; and that timber being a bad conductor, the metal receives no compensation for lost heat as it does from the earth in the case of sleepers. The system combining sleepers and bearers as used by Sir John McNeill on the Great Southern and Western in Ireland, appears faulty on the grounds that constitute the objections to the longitudinal bearer alone, except that of liability to crush into the ballast; this liability being by the greater area of surface presented to the ballast diminished in the case of the combination of the cross-sleeper and longitudinal bearer.

The formula for the strength of cast iron as adopted by Tredgold is this:

$$W = \frac{952\ bd^2}{l}$$

where W is the breaking weight at the middle in pounds, b the breadth of the beam in inches, d the depth in inches, and the divisor, l, the length between the supports in feet. It appears therefore that the strength of a rail, varying directly as the length between the supports, is three times as great when laid on supports one foot apart as when laid on supports at intervals of three feet; and that this increase of strength (or in other words this *saving of metal*) goes on as the points of support approach each other, until on the longitudinal bearer, assuming the bearer perfectly rigid, the vertical strength is measured by the force necessary to *crush* the rails. In such a case the vertical strength of an ordinary track may be expressed by the force required to press the base of the rail into the timber, or the base of the timber into the ballast. From these considerations we are led to discuss the means of increasing the resistance of the roadway to the bearer and of the bearer to the rail; seeing that the great disproportion of metal on a sleeper track and a bearer track of the same vertical strength of rail is so great as to justify us on the ground of economy in even metal alone to give exclusive preference at this stage of the argument to one or other of the systems of longitudinal bearers. Economy in construction is the end and aim of all the science and experience of the engineer; and for this reason we do not discuss the question of cross sleepers farther than we have done: the saving of metal is so very considerable with the longitudinal bearer, that we believe the interests of the railway will be served best by directing the ingenuity of the engineer to the divising of some means for meeting the faults in that system.

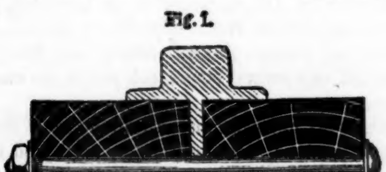
The longitudinal bearer laid on cross sleepers may, we should think, be pronounced without any hesitation the better of the two systems to which we have narrowed the question; but again, the cross-sleepers constitute such a very considerable item in the final cost and maintenance of a railway that we should not adopt it while anything may remain to be done for improving the system of longitudinal bearers held in gauge by occasional cross timbers. The first and chief objection to the latter system we consider to be its liability to sink under heavy traffic into the ballast. This may be lessened in two ways: by increasing the base of the bearer or by using a ballast sufficiently compact. We lay a great deal of stress on the latter of these remedies; why may not the platform be made to sit on a perfectly macadamised foundation? A good soaling of such stones as are used for the same purpose on a common road may be placed on the cutting or embankment as the case may be, and these being coated over with metal, gravel, and sand, using perhaps sharp gravel and lime screenings under the longitudinal bearers, the whole will form a surface sufficiently compact to resist any loading with which the platform may be charged. Such a ballasting as this, removed from the wear of weather and traffic to which it is exposed in ordinary roads, will require no repairs for centuries: and being well crushed with a ramer or roller in the first instance, will save the constant "packing" necessary under the present system; and all this at the same time that the excess of the first cost over the usual item for "ballasting" will be less than the cost of the cross sleepers, which on such a compact surface will be quite unnecessary. This ballasting will occasion no disagreeable sensation in passing along the rail laid on it, seeing that while the whole surface acts as one body it is not, when resting on a foundation of earth, by any means inelastic; and furthermore, the elasticity of the timber bearer will, when considered together with this, give an elasticity quite sufficient for easy and agreeable transit at the same time that, if the whole be constructed with care, this elasticity will stop at the point where the greatest

amount has been evolved consistent with the proper limits of wear and tear on the track.

We have still to deal with the question of drainage. With respect to the preservation of the rail from the injury of constant cold and damp, we would suggest that the top of the bearer be slightly bevelled from the middle towards each edge, the footings of the rail being made at an oblique angle with each other in order to fit the bearer exactly;—and that a strip of felt boiled in tar, be laid between the wood and the metal, taking care that the joint of the felt and rail be always kept tarred perfectly water tight. The drainage of the road we would propose to effect by these means: The cross section should be made the concave side of a curve, the point at each bearer being the highest; and the curve sinking there in a quicker slope, until at the middle it shall have amounted to a deflection from the right line of some three or four inches. At this last point the drainage water may be received in an open channel formed of the common drainage pipe used in England for field drainage, and then carried off in close pipes of the same material under the timbers, at such places as may be most judicious for that purpose. This simple arrangement does all we believe that can be done, and far more than has as yet been done for the drainage of the road; and beside its advantages to the permanent way generally, its results will be found beneficial in removing to a certain extent one of the chief causes of "slips" in embankments—threads of water within the embankment acting according to the well known principle of hydraulics with the force due to their height. The faults of the longitudinal bearer have now been discussed at length; and in submitting to the profession the remedies by which they are proposed to be met, it must be explained that the suggestions thrown out are the results of our own deliberations on the subject; and having occurred to us as the several features of the case presented themselves, are offered for trial without any more definite guarantee than that of our own strong conviction of their practical efficiency.

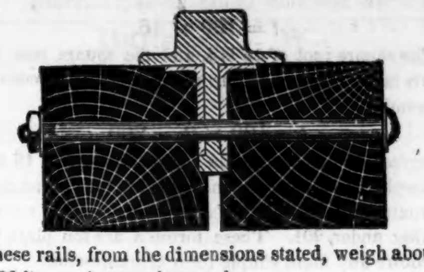
In the next place, having disposed of the question of ballasting and platform, we will go into the question of the rail itself and the means of fastening it to the bearers. We will first examine the improvements in these particulars proposed in England;—and then come forward with the result of our own consideration of the conditions of the case. The Practical Mechanics Journal for last April recommends some one of the three following systems:

Fig. 1.



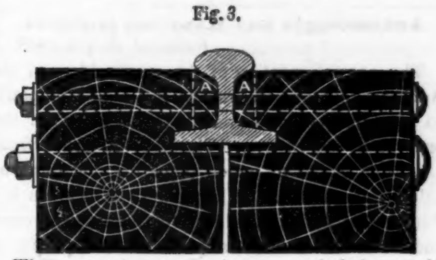
Each of these is we presume intended for longitudinal bearing. Fig. 1. consists of two baulks each 7 inches square receiving between them the tail of the rail in grooves cut into each for its reception.—The two pieces are bound together by a transverse bolt that, running through the tail, holds the rail vertically. The bearing surface of the rail is embedded in tar in order—by making the joint water tight—to save the metal from rust. Fig. 2 represents a combination exactly the same as that in Fig. 1, except in the bent wrought-iron plates used with a view to additional security at the joints. Each of

Fig. 2.



these rails, from the dimensions stated, weigh about 100 lbs. to the running yard.

Fig. 3.



These contrivances strike us as inferior to the present system of fastenings. The cross bolt is faulty in having the thread exposed; for when the nut requires tightening the thread under such circumstances is apt to break. It would appear very difficult indeed to prevent the looseness of the rail on and between the bearers after a few shocks from the flange of the wheels; and this is still more readily seen as the space between the bearers being open at the bottom there is no resistance at that point to the spreading at the top. Indeed, if the two were closed at this point, the construction would be less faulty. If, as must be the case until the fibres of the wood are somewhat compressed beyond the natural state, the rails work a little into the bearer, the whole loading becomes at once a cross strain on a bolt of ¾ inch scantling, which being forced beyond its elasticity will break. The system of bolting through the timber in a direction deviating ever so little from the line of the force exerted on it, is objectionable; and how much more so when the bolts are made to cross the timber *at right angles* to the direction of that force? We have very little hesitation in saying that these transverse bolts will split the bearers when heavily loaded: and under even light loads will render them by splits unfit for use before the expiration of half their term of service. We cannot for these reasons approve of the tracks shown in Figs. 1 and 2, though quite aware that they possess some considerable advantages. Fig. 3 represents a T-headed rail of four inches deep with a bearing on the bottom of 4½ inches. Two cross bolts are used in this. The rail here promises to remain more steadily between the timbers than in either of the former cases. However, the same objection that has been urged against the screw-threads in Figs. 1 and 2, applies in Fig. 3 with double force. It may also be remarked that the probability of cross bolts' splitting the bearers when loaded heavily is in this case, also doubled; inasmuch as here, as in figs. 1 and 2, it is intended to run those bolts across at intervals of 18 inches. The vertical strength of the bearer in fig. 3 is considerably reduced, seeing that almost all the force being applied at the base of the rail, the base meeting a resistance proportionally less than the total strength of the bearer by an amount varying as the square of the depth below the top.—In figs. 1 and 2 the lateral *stiffness*, for which in fig. 3 a larger proportion of vertical strength is sacrificed, is made to combine with the full amount of the vertical strength of the bearer, though, as observed before, the construction used can hardly obtain a sufficient amount of *steadiness*.

We will conclude the subject of permanent way here for the present; but in the next week's number, after giving that very important item of expenditure in railways the special consideration to which it is entitled, we hope to be able to place before the public some useful hints on the form and other conditions of the rail. For the present we would commend the suggestions already thrown out to the notice of our brethren throughout the country: if we might venture on a more percise form of expression, we should indeed be glad to see our views carried out experimentally by such intelligent members of the profession as Mr. A. C. Morton, of the St. Lawrence and Atlantic Railway. M. B. H.

Mechanical Agents.

Even the simplest looking contrivance requires knowledge, especially mathematical knowledge, of no ordinary degree. * * *

It is true that many of these calculations are already published in tabulated forms, and therefore the inventor is not called upon to calculate them for himself. But few can hope to become successful improvers who are not at least competent to understand their nature, and able to determine the particular points of every new contrivance where such considerations become important.—*Edinburgh Review.*

In order to place within the reach of the working mechanician—his practical experience giving him peculiar advantages in all matters of mechanical improvements—the benefits of a clear understanding of the abstract conditions of the agents employed in machinery, we propose to publish from time to time tables and rules, accompanied by brief explanatory remarks, on the leading properties of the three motive powers—steam, air, water. We will begin this week with steam.

STEAM.

The condensation and the elastic force of steam are the two properties of this fluid that give it importance as a prime mover. We will therefore tabulate the conditions and degrees of those properties, commencing with elastic force.

Elastic force of steam at various temperatures, from experiments of M. M. Arago, Proney, etc.

Temperatures. Fahrenheit.	Centigrade.	Elastic force in lbs.
254·6	123·7	31·6
261·4	132 8	42·3
272·0	133·3	42·5
280 0	138·3	49·4
290 7	149·7	67·6
305·4	151·9	71·6
308·7	153·7	75·5
326·1	163·4	96·0
335·3	168·5	109·2
336·9	169·4	112·3
342·1	172·3	119·7
357·3	180·7	145·9
362·7	183·7	156·3
368·8	187·1	169·3
371·3	188·5	172·0
380·7	193·7	194·5
389·3	198·5	214·3
295·1	201·7	231·1

The first column here shows the temperature of the steam in degrees of Fahrenheit's thermometer, the second showing the same in degrees of the Centigrade thermometer. As the Centigrade degrees are used from this forward, it may be as well to observe here for the convenience of those who use Fahrenheit that the two are convertable in this way;

$$*T = 32^\circ + \frac{9t}{5}$$

and

$$t = (T - 32^\circ)\frac{5}{9}$$

The first equation giving Centigrade degrees in their equivalent degrees on Fahrenheit, the second equation giving Fahrenheit degrees in their equivalent number on the Centigrade, T and t representing respectively, the first, degrees of Fahrenheit, the second, degrees of the Centigrade. The elastic force of steam is seen by the above table to increase with the temperature; though indeed so seemingly irregular that it has been found very difficult to discover the law of this increase. There are, however, several formulæ for calculating the elasticity from the temperature. Tredgold gives for this purpose the expression:

$$f = \left(\frac{t+75}{85}\right)^6$$

Where t is the temperature of the steam in degrees of the Centigrade, and f is the elastic force in centimetres of mercury, a centimetre being 0·39½ inches. To find the elastic force from the temperature: divide 85 into the sum of the degrees of the Cent. and the constant 75; multiply the log of the quotient by the log of 6, and the natural number corresponding to the resulting log will be the elastic force for the assumed number of degrees in centimetres of mercury. Multiply the number of centimetres so found by 0·3937, and the quotient will be the elastic force in inches of mercury of which 30 inches represent an elastic force of 14·75 lbs. avoirdupois.—This rule, though not quite so simple as could be wished, gives results remarkably close to those given by the formulæ of M. Roche, M. M. Proney and Arago, etc.; and as also agreeing very well with the experiments of the two latter, may be used when it is necessary to make the greatest possible approximation to the truth. A rule rather more simple, though not quite so much in harmony with experiments, has been published in the Practical Mechanics Journal for last May by Mr. Curr. To find the temperature from the elasticity according to the formula of Mr. Curr:

$$100\sqrt[4]{a} = t$$

the temperature in degrees of the Centigrade;

$$180\sqrt[4]{a} + 32 = T,$$

the temperature in degrees of Fahrenheit: where a is the number of atmospheres (of 14·75 lbs. to the square inch) representing the total pressure for which the temperature is to be found. By transposition we can find the pressure from the temperature, the equation in that case standing thus:

$$a = \left(\frac{T-32}{180}\right)^4 = \left(\frac{t}{100}\right)^4$$

a being the same value as before, t being the corresponding temperature on the Centigrade, and T being the same in degrees of Fahrenheit. To illustrate this by an example: What, let us inquire is the temperature of steam in degrees of Fahrenheit at a pressure of 16 atmospheres, or 236 lbs. to the square inch? Here $a = 16$, and therefore the temperature on the centigrade is

$$t = 100\sqrt[4]{16}.$$

The square root of 16 is 4, and the square root of this latter being the fourth root of 16 is 2, consequently

$$t = 100 \times 2 = 200$$

degrees of the centigrade for a pressure of 16 atmospheres—the corresponding value for t by an approximation from Arago's experiments being something under 201. These formula are too plain to require any more simple form of expression.

M. B. H.

* To find the temperatnre in Fahrenheit degrees from degrees on the Centigrade: multiply the latter by 1·8, and the result increased by 35 gives the corresponding degrees on Fahrenheit.

To find the temperature in degrees of the Centigrade from degrees of Fahrenheit: subtract 32 from the degrees of Fahrenheit and five-ninths of the remainder will give the corrdsponding degrees on the Centigrade. M. B. H.

Androscoggin and Kennebec Railroad.

Portland, July 5, 1849.

The annual meeting of the stockholders of the Androscoggin and Kennebec Railroad Company, on the third instant, was made the occasion for the opening of the road to Winthrop, 20 miles from Lewiston Falls, at which place the meeting was held for the election of Directors. The train left Portland at 7 o'clock A. M. with eight large cars, and received a constant accumulation of people at each station until its arrival at Winthrop, 54 miles from Portland. The approach of the train was announced by the discharge of cannon and the ringing of bells. The immense concourse of people assembled at the terminus greeted its arrival with enthusiastic cheering. There was no formal opening of the road, and the completion of the line to Waterville, 83 miles from Portland, is looked forward to as the occasion for a public demonstration.

There was a large gathering of stockholders, and the whole day was consumed in transacting the business of the company, the Hon. Mr. Boutelle, President of the company, in the chair. The Reports of the Directors and Treasurer were read by Hon. S. P. Benson, the Secretary, giving a full statement of the condition of the company. By these it appeared, that the amount expended for the construction and equipment of the road to June 18, 1849, was $927,780 77, and the money received into the treasury to the same date amounted to $937,754 75. Of this sum $146,907 was received on account of the assessments on the stock, and the balance from loans.

The length of the line is 55 miles, and the Directors estimate the entire cost of the road and equipment at $1,350,000. They require a further sum of $311,773 above the present means to complete it.

The grading is nearly finished to Waterville, and the laying of the track is going forward with a view to its completion by October, 1849.

The equipment of the road consists of 4 locomotive engines, 6 passenger cars, 10 box freight cars, 20 platform cars, and one mail car.

The stockholders voted to reduce the number of Directors from 13 to 7, after full discussion.

Judge Preble of Portland moved the appointment of a committee of the stockholders to investigate into the doings of the Directors, to report at a future day. The particular object of his motion was regarded as having reference to the amount of brokerage received by the Directors on monies raised by them on loans for the company.

The Directors submitted a report of their doings in regard to this loan, by which it appeared that on a loan of $200,000 raised by John Ware, Esq., of Athens, one of the directors, they allowed him a brokerage or bonus of *eight per cent.* on the amount. It was raised at a time of great stringency in the money market. On motion of Mr. Barnes, of Portland, the doings of the Directors in the premises be ratified by the shareholders.

A committee of investigation was appointed, consisting of Judge Preble, of Portland, Dr. A. Gardiner, of Lewiston, and Mr. Stackpole, Esq., of Waterville.

A choice of Directors was then had by ballot, and

T. Boutelle, of Waterville,
John Ware, of Athens,
Sam'l. Taylor, Jr., of Fairfield,
Solomon Jenness, of Readfield,
Josiah Little, Jr. of Lewiston,
William Goodnow, of Portland,
Neil Dow, of do

were elected. Messrs. Boutelle, Ware, Taylor and Jenness without opposition. The Portland shareholders nominated P. Barnes and Ira Crocker.—Samuel Pichard, of Lewiston, was nominated by the stockholders at Lewiston and vicinity, in room of Mr. Little. Messrs. Barnes, Crocker, and Pickard had very nearly the same number as Messrs. Goodnow, Dow and Little, who were elected.

On motion of Judge Ware, of Portland, a stockholders' committee was raised to examine into the doings of the Directors for the ensuing year, and to have an advising oversight of the road, without any executive powers. Judge Ware, of Portland, Col. J. R. Bachelder, of Readfield, and H. A. Smith, Esq., of Waterville, were appointed such committee. Subsequently, the stockholders re-considered the vote appointing this committee, and the whole matter was indefinitely postponed. The shareholders voted to authorise the Directors to issue preferred stock to supply the funds to complete the road, or to issue bonds at their discretion.

The meeting of stockholders was large. The discussion of the various matters that came up was characterised by distinguished ability, and carried on in perfectly good temper. Some of the stockholders complained that the Directors had paid too high to masonry to carry on the work. We have rarely witnessed a similar occasion of greater interest than this. All parties were eager in urging the completion of the road, and the principal question was as to the best means to raise the money.

The comp'y. met at *ten o'clock A.M.* and excepting a brief respite for dinner, held a continued sitting till *half-past eight P. M.* Hon. W. B. S. Moore, of Bangor, Hon. S. P. Benson and Seth May, Esq., of Winthrop, Messrs. Noyes, Smith, and Stackpole of Waterville, Dr. A. Garcelon, of Lewiston, and Hon. Judge Preble, Hon. Judge Ware, Hon. J. Anderson and Messrs. Barnes, Mussy and Poor, of Portland, and several others took part in the discussions.

Eighty-six miles of finished railroad now terminate at Portland, coming from the north and east, all of which have been opened within the last 12 months. *Eighty-theee* miles more are in rapid progress, in continuation of the same lines, *seventy* miles of which will be opened for travel the present year. Portland is soon destined to become the centre of an important system of railways extending through the whole State.

New Hampshire.

Manchester and St. Lawrence Railroad.

The annual meeting of this company was held at Manchester, N. H., on the 26th ult. It appears from the representations of the officers of the corporation that the road is rapidly progressing towards completion, and will probably ready for permanent use as early as October next.

The following gentlemen were chosen Directors for the ensuing year, viz:

James U. Parker, Merrimack..........2791
John A. Richardson, Durham..........2791
David A. Bunton, Manchester..........2796
John N. Anderson, Londonderry..........2791
John Tenney, Methuen..........4572
Edward Crane, Boston..........4567
Nath'l. B. Baker, Concord..........4548

At a subsequent meeting of the Board, Hon Jas. U. Parker was re-elected President, and Nath'l B. Baker Clerk pro tem.

The whole number of shares represented was 4,572; necessary to a choice 2287.

To Railway Companies.

Contracts.—In justice to the large number of our subscribers, who being engaged in the execution of railway contracts, are *scattered through the country*, we beg leave to suggest to companies that our Journal is the only means of bringing under the eye of capital, energy and experience, the notices of lettings that appear from time to time in *papers of a mere local circulation.* The advantages to a company of bringing into competition in letting of contracts the greatest amount of skill and capital, are clear and distinct; and we would therefore only point out the prudence of advertising all such things in this Journal as the only one that circulates among contractors, of whom, from the nature of their duties, *only at most a few can have an opportunity of seeing the advertisement that is confined to a local print.*

Patents for Inventions.

THE Subscriber offers his services for the procuration of Patents in the UNITED STATES; in the CANADAS and other British Colonial possessions; in the SPANISH, FRENCH and other WEST INDIES.

ALSO IN EUROPE.

ENGLAND WITH COLONIES; SCOTLAND and IRELAND. FRANCE, BELGIUM HOLLAND, etc.

☞ The foreign patents are procured through special agents, established by, and solely responsible to this establishment. At this office may be obtained all documents required in patent business; *Deeds, Conveyances, Agreements, Assignments*, etc. Counsel given on questions involving points of law in Contested Cases, and written opinions, on the title claims, etc., where the validity of a Patent is questioned.

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Drawings of all kinds furnished to parties who wish to prosecute their own patent business. Accurate working drawings for Pattern Makers or for making Contracts with Manufacturers; calculations and drawings made, for constructing difficult and complicated machines or parts of machines. Draughtsmen furnished to take Drawings of Mills, Mill Sites, and Machinery, in any part of the country.

Pamphlets, containing full information on the above subjects, furnished gratis.

JOSEPH P. PIRSSON, Civil Engineer,
Offic, No. 5 Wall St.

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THE Subscriber having been appointed sole Agent for Faber's Magnetic Water Gauge, is now ready to supply the trade, and also individuals with this celebrated instrument. Besides the greatest safety from explosion resulting from its use, it is a thorough check against careless stoking and feeding. In marine engines it will regulate the exact quantity required in the "blow off." Pamphlets containing full information, can be had free on application to the Agent,

JOSEPH P. PIRSSON,
Civil Engineer, 5 Wall st.

Situation Wanted,

AS an Engineer on a Canal or Railroad, by a gentleman from Germany, who is familiar with the English and French languages, and who has for seven years been engaged in the study and practice of Engineering and the Superintendence of Public Works. Address

LEWIS BURYER,
2126 64 Avenue B, New York.

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Arrowsmith, A. T.,
Buckfield Branch Railroad, Buckfield, Me.

Baneks, C. W.,
Engineer's Office, Southern Railroad, Jackson, Miss.

Berrien, John M.,
Michigan Central Railroad, Marshall, Mich.

Clement, Wm. H.,
Little Miami Railroad, Cincinnati, Ohio.

Fisk, Charles B.,
Cumberland and Ohio Canal, Washington, D. C.

Felton, S. M.,
Fitchburgh Railroad, Boston, Mass.

Floyd-Jones, Charles,
New York and Harlem Railroad Extension, Lithgow, Dutchess Co., N. Y.

Ford, James K.,
New York.

Gzowski, Mr.,
St. Lawrence & Atlantic Railroad, Montreal, Canada.

Gilbert, Wm. B.,
Rutland and Burlington Railroad, Rutland, Vt.

Grant, James H.,
Nashville and Chattanooga R. R., Nashville, Tenn.

Harry, P.,
Binghamton, New York.

Holcomb, F. P.
Southwestern Railroad, Macon, Ga.

Higgins, B.
Mansfield and Sandusky Railroad, Sandusky City, O.

Johnson, Edwin F.
New York and Boston Railroad, Middletown Ct.

Latrobe, B. H.,
Baltimore and Ohio Railroad, Baltimore, Md.

Miller, J. F.,
Worcester and Nashua Railroad, Worcester, Mass.

Morton, A. C.,
Atlantic and St. Lawrence Railroad, Portland, Me.

McRae, John,
South Carolina Railroad, Charleston, S. C.

Nott, Samuel,
Lawrence and Manchester Railroad, Boston,

Reynolds, L. O.,
Central Railroad, Savannah, Ga.

Roberts, Solomon W.,
Ohio and Pennsylvania Railroad, Pittsburgh, Pa.

Robinson, James P.,
Androscoggin & Kennebec Railroad, Waterville, Me.

Schlatter, Charles L.,
Northern Railroad (Ogdensburg), Malone, N. Y.

Stark, George.,
Bost., Con. and Mont. R. R., Meredith Bridge, N. H.

Steele, J. Dutton,
Pottstown, Pa.

Trimble, Isaac R.,
Philad., Wil. & Baltimore Railroad, Wilmington, Del.

Tinkham, A. W.,
United States Fort, Bucksport, Me.

Thomson, J. Edgar.,
Pennsylvania (Central) Railroad, Philadelphia.

Whipple, S.,
Civil Engineer and Bridge Builder, Utica, N. Y.

Williams, E. P.,
Auburn and Schenectady Railroad, Auburn, N. Y.

Williams, Charles H.,
Milwaukie, Wisconsin.

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MR. M. BUTT HEWSON, *Civil Engineer*, offers his services to Companies about to carry out the surveys or works of a line of Navigation or Railroad. He can give satisfactory references in New York City as to his professional qualifications; and will therefore merely refer here to the fact of his having been engaged for upwards of two years conducting important Public Works for the British Government.

Communications will find Mr. Hewson at the office of the Railroad Journal, 54 Wall Street, New York.

J. T. Hodge,
EAGLE RIVER P. O., LAKE SUPERIOR.

James Laurie, *Civil Engineer,*
No. 23 RAILROAD EXCHANGE, BOSTON, MASS.

Railroad Routes explored and surveyed. Estimates, Plans and Specifications furnished for Dams, Bridges, Wharves, and all Engineering Structures.

October 14, 1848. 6m*

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OF THE UNITED STATES NAVY YARD,
PENSACOLA, FLORIDA.,
PATENTEE OF THE
HERRON RAILWAY TRACK.

Models of this Track, on the most improved plans, may be seen at the Engineer's office of the New York and Erie Railroad.

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Cruse & Burke,
Civil Engineers, Architects and Surveyors,
Office, New York State Institution of Civil Engineers,
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Drawings, specifications and surveys accurately executed. Pupils instructed theoretically and practically at a moderate premium.

May 26, 1849.

To Railroad Companies.
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SAFETY AND ECONOMY.
NORRIS' LOCOMOTIVE WORKS,
SCHENECTADY, NEW YORK,

Are Manufacturing Wrought Iron Driving, Truck, Tender, and Car Wheels—made from the best American Iron. Address E. S. NORRIS.

May 16, 1849.

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GENERAL COMMISSION MERCHANTS,
NO. 51 EXCHANGE PLACE,
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THE NEW JERSEY IRON CO'S WORKS AT Boonton, are now in full operation, and can execute orders for Railroad Bars of any required pattern, equal in quality to any made in this country. Apply to

J. F. MACKIE,
Nos. 85 and 87 Broad St.

New York, June 8, 1849.

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OF approved T patterns, weighing 56 to 60 lbs. per lineal yard, made by the best English manufacturers, and under our own specification and inspection. In store and to arrive. For sale by

DAVIS, BROOKS, & CO.,
68 Broad street.

New York, June 1, 1849. tf

☞ The above will favorably compare with any other rails.

Railroad Iron, Pig Iron, &c.

600 Tons of T Rail 60 lbs. per yard.
25 Tons of 2¼ by ⅝ Flat Bars.
25 Tons of 2¼ by 9-16 Flat Bars.
100 Tons No. 1 Gartsherrie.
100 Tons Welsh Forge Pigs.

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A. & W. DENMEAD & SON,
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IRON FOUNDRY AND MACHINE SHOP
In complete operation, are prepared to execute faithfully and promptly, orders for
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Slide, Hand or Chuck Lathes,
Machinery for cutting all kinds of Gearing.
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Gas and Water Pipes of all sizes, warranted,
Railroad Wheels with best faggotted axle, furnished and fitted up for use, complete

☞Being provided with Heavy Lathes for Boring and Turning Screws, Cylinders, etc., we can furnish them of any pitch, length or pattern.

☞ Old Machinery Renewed or Sepaired—and Estimates for Work in any part of the United States furnished at short notice.

June 8, 1849.

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THE TRENTON IRON COMPANY ARE NOW turning out one thousand tons of rails per month, at their works at Trenton, N. J. They are prepared to enter into contract to furnish rails of any pattern, and of the very best quality, made exclusively from the famous Andover iron. The position of the works on the Delaware river, the Delaware and Raritan canal, and the Camden and Amboy railroad, enables them to ship rails at all seasons of the year. Apply to

COOPER & HEWITT, *Agents.*
17 Burling Slip, New York.

October 30. 1848.

American Cast Steel.

THE ADIRONDAC STEEL MANUFACTURING CO. is now producing, from American iron, at their works at Jersey City, N.J., Cast Steel of extraordinary quality, and is prepared to supply orders for the same at prices below that of the imported article of like quality. Consumers will find it to their interest to give this a trial. Orders for all sizes of hammered cast steel, directed as above, will meet with prompt attention.

May 28, 1849.

SPRING STEEL FOR LOCOMOTIVES, TENDERS AND CARS.—The subscriber is engaged in manufacturing spring steel from 1¼ to 6 inches in width, and of any thickness required: large quantities are yearly furnished for railroad purposes, and wherever used its quality has been approved of. The establishment being large, can execute orders with great promptitude, at reasonable prices, and the quality warranted. Address J. F. WINSLOW, *Agent,*
Albany Iron and Nail Works.

Pig and Bloom Iron.

THE Subscribers are Agents for the sale of numerous brands of Charcoal and Anthracite Pig Iron, suitable for Machinery, Railroad Wheels, Chains, Hollowware, etc. Also several brands of the best Puddling Iron, Juniata Blooms suitable for Wire, Boiler Plate, Axe Iron, Shovels, etc. The attention of those engaged in the manufacture of Iron is solicited by

A. WRIGHT & NEPHEW,
Vine Street Wharf, Philadelphia.

Railroad Iron.

RAILROAD IRON & LOCOMOTIVE TIRES imported to order, and constantly on hand, by

A. & G. RALSTON,
4 South Front St., Philadelphia.

Railroad Iron.

THE MOUNT SAVAGE IRON WORKS, Allegany county, Maryland, having recently passed into the hands of new proprietors, are now prepared, with increased facilities, to execute orders for any of the various patterns of Railroad Iron. Communications addressed to either of the subscribers will have prompt attention. J. F. WINSLOW, *President*
Troy, N.Y.
ERASTUS CORNING, Albany.
WARREN DELANO, Jr., N.Y.
JOHN M. FORBES, Boston.
ENOCH PRATT, Baltimore, Md.

November 6, 1848.

WILLIAM JESSOP & SONS' CELEBRATED CAST-STEEL.

The subscribers have on hand, and are constantly receiving from their manufactory,
PARK WORKS, SHEFFIELD,
Double Refined Cast Steel—square, flat and octagon.
Best warranted Cast Steel—square, flat and octagon.
Best double and single Shear Steel—warranted.
Machinery Steel—round.
Best and 2d qy. Sheet Steel—for saws and other purposes.
German Steel—flat and square, "W. I. & S." "Eagle" and "Goat" stamps.
Genuine "Sykes," L Blister Steel.
Best English Blister Steel, etc., etc., etc.
All of which are offered for sale on the most favorable terms by WM. JESSOP & SONS,
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Also by their Agents—
Curtus & Hand, 47 Commerce street, Philadelphia.
Alex'r Fullerton & Co., 119 Milk street, Boston.
Stickney & Beatty, South Charles street, Baltimore.

May 6, 1848.

Railroad Iron.

100 Tons 2½ x ⅝, | 30 Tons Railroad.

All fit to re-lay. For sale cheap by

PETTEE & MANN,
228 South St., New York.

May 16, 1849. *

MANUFACTURE OF PATENT WIRE ROPE and Cables for Inclined Planes, Standing Ship Rigging, Mines, Cranes, Tillers, etc, by
JOHN A. ROEBLING, *Civil Engineer*,
Pittsburgh, Pa.

These *Ropes* are now in successful operation on the planes of the Portage railroad in Pennsylvania, on the Public Slips, on Ferries, and in Mines. The first rope put upon Plane No. 3, Portage railroad, has now run four seasons, and is still in good condition.

Iron.

THE Works of the New Jersey Iron Company at Boonton, N. J., having been recently enlarged and put in good repair, the company are prepared to receive orders for Iron, which will be executed with dispatch; and they warrant their iron equal in quality and finish to any in this country.
½ Round and square, to 6 inches,
½ Flat " 4 "
Ovals, half-ovals and half-round.
Hoop, band and scroll iron.
Nail plates, superior charcoal Horse shoe,
Iron, sheet and Boiler iron,
Tire iron for locomotives.
Railroad spikes.
Pig iron of superior quality for chilling.
do, for foundry purposes.
For sale by JOHN F. MACKIE,
85 & 87 Broad Street,
Sole agent for the New Jersey Iron Co,
June 9, 1849.

Railroad Iron.

THE UNDERSIGNED ARE PREPARED TO contract for the delivery of English Railroad Iron of favorite brands, during the Spring. They also receive orders for the importation of Pig, Bar, Sheet, etc. Iron. THOMAS B. SANDS & CO.,
22 South William street,
New York.

February 3, 1849.

Railroad Iron.

THE SUBSCRIBERS ARE PREPARED TO take orders for Railroad Iron to be made at their Phœnix Iron Works, situated on the Schuylkill River, near this city, and at their Safe Harbor Iron Works, situated in Lancaster County, on the Susquehannah river; which two establishments are now turning out upwards of 1800 tons of finished rails per month.

Companies desirous of contracting will be promptly supplied with rails of any required pattern, and of the very best quality.

REEVES, BUCK & CO.,
45 North Water St., Philadelphia.

March 15, 1849.

Railroad Iron.

THE Undersigned offer for sale 3000 Tons Railroad Iron at a fixed price, to be made of any required ordinary section, and of approved stamp.

They are generally prepared to contract for the delivery of Railroad Iron, Pig, Bar and Sheet Iron—or to take orders for the same—all of favorite brands, and on the usual terms. ILLIUS & MAKIN.
41 Broad street.

March 29, 1849. 3m.13

American Pig, Bloom and Boiler Iron.

HENRY THOMPSON & SON,
No 57 South Gay St., Baltimore, Md.,

Offer for sale, *Hot Blast* Charcoal *Pig Iron* made at the *Catoctin* (Maryland), and *Taylor* (Virginia), *Furnaces; Cold Blast* Charcoal Pig Iron from the *Cloverdale* and *Catawba*, Va., Furnaces, suitable for *Wheels* or *Machinery* requiring *extra* strength; also *Boiler* and *Flue Iron* from the mills of Edge & Hilles in Delaware, and *best quality Boiler Blooms* made from *Cold Blast Pig Iron* at the *Shenandoah Works*, Va. The productions of the above establishments can always be had at the lowest market prices for approved paper.

American Pig Iron of other brands, and *Rolled* and *Hammered Bar Iron* furnished at lowest prices. Agents for *Watson's Perth Amboy Fire Bricks*, and Rich & Cos. New York Salamander Iron Chests.

Baltimore, June 14, 1849. 6 mos

Iron Wire.

REFINED IRON WIRE OF ALL KINDS, Card, Reed, Cotton-flyer, Annealed, Broom, Buckle, and Spring Wire. Also all kinds of Round, Flat or Oval Wire, best adapted to various machine purposes, annealed and tempered, straightened and cut any length, manufactured and sold by
ICHABOD WASHBURN.
Worcester, Mass., May 25, 1849.

American and Foreign Iron.

FOR SALE,

300	Tons	A 1, Iron Dale Foundry Iron.
100	"	1, " " "
100	"	2, " " "
100	"	" Forge "
400	"	Wilkesbarre " "
100	"	"Roaring Run" Foundry Iron.
300	"	Fort " "
50	"	Catoctin " "
250	"	Chikiswalungo " "
50	"	"Columbia" "chilling" iron, a very superior article for car wheels.
75	"	"Columbia" refined boiler blooms.
30	"	1 x ½ Slit iron.
50	"	Best Penna. boiler iron.
50	"	"Puddled" "
50	"	Bagnall & Sons refined bar iron.
50	"	Common bar iron.

Locomotive and other boiler iron furnished to order.
GOODHUE & CO.,
64 South street
New York.

PATENT HAMMERED RAILROAD, SHIP & BOAT SPIKES. — The Albany Iron Works have always on hand, of their own manufacture, a large assortment of Railroad, Ship and Boat Spikes from 2 to 12 inches in length, and of any form of head From the excellence of the material always used in their manufacture, and their very general use for rail roads and other purposes in this country, the manufacturers have no hesitation in warranting them fully equal to the best spikes in market, both as to quality and appearance. All orders addressed to the subscribers at the works will be promptly executed.
JOHN F. WINSLOW, *Agent.*
Albany Iron and Nail Works, Troy, N. Y.
The above Spikes may be had at factory prices, of Erastus Corning & Co Albany; Merritt & Co., New York; E. Pratt & Brother, Baltimore Md

LAP—WELDED WROUGHT IRON TUBES FOR TUBULAR BOILERS,

FROM 1 1-2 TO 8 INCHES DIAMETER.

These are the ONLY Tubes of the same quality and manufacture as those so extensively used in England, Scotland, France and Germany, for Locomotive, Marine and other Steam Engine Boilers
THOMAS PROSSER,
Patentee.
28 Platt street, New York.

Roman Cement,

OF the best quality, now landing from ship Hendrick Hudson, from London, made by Billingsley, Mial & Co., and superior to anything of the kind manufactured in England. For sale by G. T. SNOW,
109 Water Street, New York.

Large Wooden Pumps.

SEVERAL Large Wooden Square Pumps, of various sizes from 6 to 24 inches, and lengths from 10 to 25 feet, strongly bolted and strapped together with wrought iron; and used to great advantage on the Boston Water works; also two screw pumps each 25 feet long and 2¼ feet in diameter, are now for sale by the Boston Water Commissioners.

For further particulars inquire at No. 119 Washington Street, Boston, or of E. S. CHESBROUGH, West Newton.

June 8, 1849.

P. S. DEVLAN & CO's Patent Lubricating Oil.

THE Subscribers invite the attention of Railroads, Steamboats, Machinists, etc., to the above article of Oil; they are prepared to supply it in any quantity. Certificates of its superiority over all other oils, from several of the largest Works and Railroads, can be seen at our office. KENNEDY & GELSTON, 5½ Pine street, New York,

Sole Agents for the New England States and State of New York. 1y14

TO RAILROAD COMPANIES AND MANUfacturers of Railroad Machinery. The subscribers have for sale American and English Bar Iron, of all sizes; English Blister, Cast, Shear and Spring Steel; Juniata Rods; Car Axles, made of double refined iron; Sheet and Boiler Iron, cut to pattern; Tires for Locomotive Engines, and other railroad carriage wheels, made from common and double refined B. O. Iron; the latter a very superior article. The Tires are made by Messrs. Baldwin and Whitney, Locomotive Engine Manufacturers of this city. Orders addressed to them, or to us, will be promptly executed.

When the exact diameter of the wheel is stated in the order, a fit to those wheels is guaranteed, saving to the purchaser the expense of turning them out inside.

THOMAS & EDMUND GEORGE,
a45 N. E. cor. 12th and Market sts., Philad., Pa.

To Railroad Companies and Contractors.

FOR SALE.—Two Locomotive Engines and Tenders, at present in use on the Beaver Meadow Railroad, being too light for their coal trains, but well calculated for either gravel or light passenger trains.

They weigh, in running order, about 8 tons each—having one pair of driving wheels 4 feet diameter, 4 truck wheels 30 inches diameter, with cylinders 10 in. diameter, and 18 inches stroke of piston. Tenders on 4 wheels. Address JAMES ROWLAND,
Prest. Beaver Meadow Railroad & Coal Co., Philadelphia.
or, L. CHAMBERLAIN, Sec'y, at Beaver Meadow, Pa.

May 19, 1849. 20tf

India-rubber for Railroad Cos.

RUBBER SPRINGS—*Bearing and Buffer—Fuller's Patent—Hose* from 1 to 12 inches diameter. Suction Hose. *Steam Packing*—from 1-16 to 2 in. thick. *Rubber and Gutta Percha Bands.* These articles are all warranted to give satisfaction, made under Tyer & Helm's patent, issued January, 1849.—No lead used in the composition. Will stand much higher heat than that called "Goodyear's," and is in all respects better than any in use. Proprietors of railroads do not be overcharged by pretenders.

HORACE H. DAY,
Warehouse 23 Courtlandt street.
New York, May 21, 1849.

NICOLL'S PATENT SAFETY SWITCH FOR Railroad Turnouts. This invention for some time in successful operation on one of the principal railroads in the country, effectually prevents engines and their trains from running off the track at a switch, left wrong by accident or design. It acts independently of the main track rails; being laid down or removed without cutting or displacing them.

It is never touched by passing trains, except when in use, preventing their running off the track. It is simple in its construction and operation, requiring only two castings and two rails; the latter, even if much worn or used, not objectionable.

Working models of the Safety Switch may be seen at Messrs. Davenport, Bridges & Kirk's Cambridge Port, Mass., and at the office of the Railroad Journal, New York.

Plans, Specifications, and all information obtained, on application to the Subscriber, Inventor and Patentee. G. A. NICOLLS, Reading, Pa.

Large Pumps.

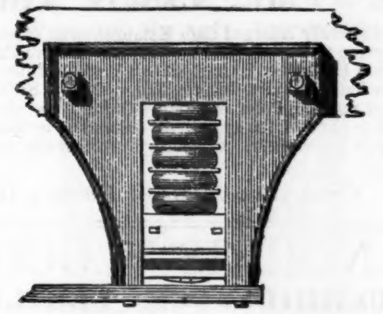
THE Boston Water Commissioners offer for sale a large number and variety of Wooden Square Pumps, used in clearing excavations from water during the construction of the Aqueducts.

Also Two Large Screw Pumps, each 25 feet long and 2¼ feet in diameter.

For further particulars, enquire at the office of the Water Commissioners, 119 Washington St., Boston, or of E. S. Chesbrough, West Newton.

May 19, 1849. 6w20

Patent India-rubber Springs.



FULLER & CO. beg that parties interested in the use of these Springs will not be misled by exparte statements, but will examine the actual Patents and judge for themselves.

The statements made by Messrs. Crane & Ray shall be treated seriatim.

They claim to have first introduced India-rubber Springs about two years since, whereas they were used by Fuller & Co. nearly four years ago.

They claim the exclusive right to use Sprngs. They have no right whatever; every spring they make is an infringement upon Fuller's patent, dated 1845. They claim the sole right to make India rubber, and apparently think because a species of India-rubber was patented some years since, that no person can make any other now. A patent was *granted in January last* to Messrs. Tyer & Helm for a new and improved kind of Vulcanized rubber which is used by Fuller & Co.

Fuller's springs it is needless to say are in very general use, although Messrs. Crane & Ray pretend that they know of only one or two instances. Fuller & Co. guarantee all parties who use their springs.

As to the Legal proceedings—an action has been commenced against one company for an alleged infringement of Goodyear's patent, but is being defended with every prospect of success. An action has also been commenced by Fuller & Co., against parties for an infringement of Fuller's patent, and *this will be done in every case of violation.*

In every case in which Fuller's spring has been applied, it has been pronounced superior to that made by Mr. Ray, and this fact induces Messrs. Crane & Ray to claim the right of using it. They attempt to lead the public from the real question at issue, by producing a Deposition as to Mr. Ray having *tried to make* a spring which Mr. Fuller *did make* and patent. If Mr. Ray did invent a spring in 1844, why did he not apply for a patent, and not wait until 1848, when his application was rejected!

Mr. Knevitt has never stated that the springs were put on by him, which are refered to in Mr. Hale's article, but he does state that those springs are made according to Mr. Fuller's specification, and consequently are an infringement upon it. The article of Mr. Hale in the Boston Advertiser, quoted by Messrs Crane & Ray, was followed immediately by a letter in the same paper, from Mr. Knevitt, setting forth the facts of the case.

The springs refered to were put on by Mr. Ray before Mr. Knevitt came to the United States; when he arrived he gave Mr. Ray notice not to proceed further in making or vending such springs; Mr. Ray then said he did not wish to infringe, and would not continue to do so, and he then contrived an India-rubber and Air spring which totally failed.

In the selection of their first agent, Fuller & Co. were particularly unfortunate, and their reason for adverting to it is simply that it may tend to throw light on subsequent transactions, and furnish a reply to the remark, "that this opposition was invited by their own delay in getting the thing to work." The individual refered to undertook the agency for Fuller's springs, and left Liverpool on the 1st January, 1847, furnished with a complete set of drawings, models, etc., and every necessary instruction to make arrangements respecting the supply of material, and to have it at work within the time limited by law; but *from that hour to the present, not a single communication has been received from the said agent.* Some of their models, however, they have traced into the hands of parties now seeking to invade their rights, and by whom they understand they have been exhibited as specimens of their own invention.

The superiority of Fuller's spring is implied in the offer of the New England Car Co. to make springs upon his principle (now that a preference is given to the disc and plate form) and this notwithstanding the fact, that Fuller & Co. have a patent, and that Mr. Ray's application for one was rejected. The public can judge which company's course has been the most honorable, or whose statements are entitled to consideration.

Fuller's springs can be obtained of *Mr. Knevitt* the Agent, at 38 Broadway New York, and of *Messrs. James Lee & Co.*, 18 India Wharf, Boston.

May 26, 1849.

C. W, Bently & Co.,

PORTABLE Steam Engine and Boiler Manufacturers, East Falls Avenue, near Pratt St. Bridge, BALTIMORE, MARYLAND.

Their Engines are simple in their construction, compact and durable; they require no brick work in setting them, and occupyidg but a small space (a six horse power engine and boiler, standing on a cast iron plate of three by six feet.)

They also manufacture Major W. P. Williamson's new oscillating Engine; a superior article, combining cheapness and simplicity (one of which may be seen in operation at their shop.) Both of these engines are adapted to any purpose, where power is required, and may be made of any capacity; and for economy in use of fuel are unsurpassed.

All kinds of machinery made to order. Steam Generators, Force Pumps, Wrought Iron Pipes and Fillings for Steam, Water, Gas, etc., constantly on hand,

Baltimore, June 6, 1849.

PHILADELPHIA CAR MANUFACTORY,

CORNER SCHUYLKILL 2D AND HAMILTON STS.,

SPRING GARDEN, PHILADELPHIA CO., PA.

Kimball & Gorton,

Having recently constructed the above works, are prepared to construct at short notice all kinds of

RAILROAD CARS, Viz:

Passenger Cars of all classes—Open and Covered Freight and Express Cars—Coal Cars—Hand Cars & Trucks of all descriptions.

They are also prepared to furnish Chilled Wheels of any pattern. Car Wheels & Axles fitted and furnished. Snow Ploughs and Tenders made to order. Steel and other Springs always on hand.

All orders will be filled at short notice, and upon as good terms as at any other establishment in the country.

Omnibuses from the Exchange run within one square of the manufactory every 10 minutes during the day.

Philadelphia, June 16, 1849. 1y25

LAWRENCE'S ROSENDALE HYDRAULIC Cement. This Cement is warranted equal to any manufactured in this country, and has been pronounced superior to Francis' "Roman." Its value for Aqueducts, Locks, Bridges, Flooms, and all Masonry exposed to dampness, is well known, as it sets immediately under water, and increases in solidity for years.

For sale in lots to suit purchasers, in tight papered barrels, by JOHN W. LAWRENCE,
142 Front-street, New York.

☞ Orders for the above will be received and promptly attended to at this office. 32 1y.

Text Book of Mechanical Drawing,

FOR the use of SCHOOLS and SELF-INSTRUCTION, containing,

1st. A series of progressive practical problems in Geometry, with full explanations, couched in plain and simple terms; showing also the construction of the *parallel ruler, plane scales* and *protractor.*

2d. Examples for drawing *plans, sections* and *elevations* of Buildings and Machinery, the mode of drawing elevations from *circular* and *polygonal* plans, and the drawing of Roman and Grecian Mouldings.

3d. An introduction to *Isometrical drawing*, with 4 plates of examples.

4th. A treatise on *Linear Perspective*, with numerous examples and full explanations, rendering the study of the art easy and agreeable.

5th. Examples for the projection of shadows.

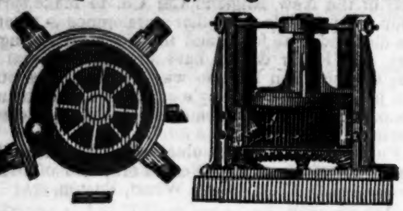
The whole illustrated with 50 STEEL PLATES.

Published by WM. MINIFIE & CO.,
114 Baltimore St., Baltimore, Md.

Price $3, to be had of all the principal booksellers.

MACHINERY.

Henry Burden's Patent Revolving Shingling Machine.



THE Subscriber having recently purchased the right of this machine for the United States, now offers to make transfers of the right to run said machine, or sell to those who may be desirous to purchase the right for one or more of the States.

This machine is now in successful operation in ten or twelve iron works in and about the vicinity of Pittsburgh, also at Phœnixville and Reading, Pa., Covington Iron Works, Md., Troy Rolling Mills, and Troy Iron and Nail Factory, Troy, N. Y., where it has give universal satisfaction.

Its advantages over the ordinary Forge Hammer are numerous: considerable saving in first cost; saving in power; the entire saving of shingler's, or hammersman's wages, as no attendance whatever is necessary, it being entirely self-acting; saving in time from the quantity of work done, as one machine is capable of working the iron from sixty puddling furnaces; saving of waste, as nothing but the scoria is thrown off, and that most effectually; saving of staffs, as none are used or required. The time required to furnish a bloom being only about six seconds, the scoria has no time to set, consequently is got rid of much easier than when allowed to congeal as under the hammer. The iron being discharged from the machine so hot, rolls better and is much easier on the rollers and machinery. The bars roll rounder, and are much better finished. The subscriber feels confident that persons who will examine for themselves the machinery in operation, will find it possesses more advantages than have been enumerated. For further particulars address the subscriber at Troy, N. Y. P. A. BURDEN.

Railroad Spikes and Wrought Iron Fastenings.

THE TROY IRON AND NAIL FACTORY, exclusive owner of all Henry Burden's Patented Machinery *for making Spikes*, have facilities for manufacturing large quantities upon short notice, and of a quality unsurpassed.

Wrought Iron Chairs, Clamps, Keys and Bolts for Railroad fastenings, also made to order. A full assortment of Ship and Boat Spikes always on hand.

All orders addressed to the Agent at the Factory will receive immediate attention.

P. A. BURDEN, *Agent*,
Troy Iron and Nail Factory, Troy, N. Y.

RAILROAD WHEELS.

CHILLED RAILROAD WHEELS.—THE UNdersigned are now prepared to manufacture their Improved Corrugated Car Wheels, or Wheels with any form of spokes or discs, by a new process which prevents all strain on the metal, such as is produced in all other chilled wheels, by the manner of casting and cooling. By this new method of manufacture, the hubs of all kinds of wheels may be made whole—that is, without dividing them into sections—thus rendering the expense of banding unnecessary; and the wheels subjected to this process will be much stronger than those of the same size and weight, when made in the ordinary way.

A. WHITNEY & SON,
Willow St., below 13th,
Philadelphia, Pa.

CHILLED RAILROAD WHEELS.—THE UNdersigned, the *Original Inventor* of the *Plate Wheel* with solid hub, is prepared to execute all orders for the same, promptly and faithfully, and solicits a share of the patronage for those kind of wheels which are now so much preferred, and which he originally produced after a large expenditure of time and money.

A. TIERS,
Point Pleasant Foundry.

He also offers to furnish Rolling Mill Castings, and other Mill Gearing, with promptness, having, he believes, the largest stock of such patterns to be found in the country. A. T.

Kensington, Philadelphia Co.,
March 12, 1848.

ENGINE AND CAR WORKS.

DAVENPORT & BRIDGES,

HAVING ASSOCIATED WITH THEM

MR. LEWIS KIRK, OF READING, PA.,

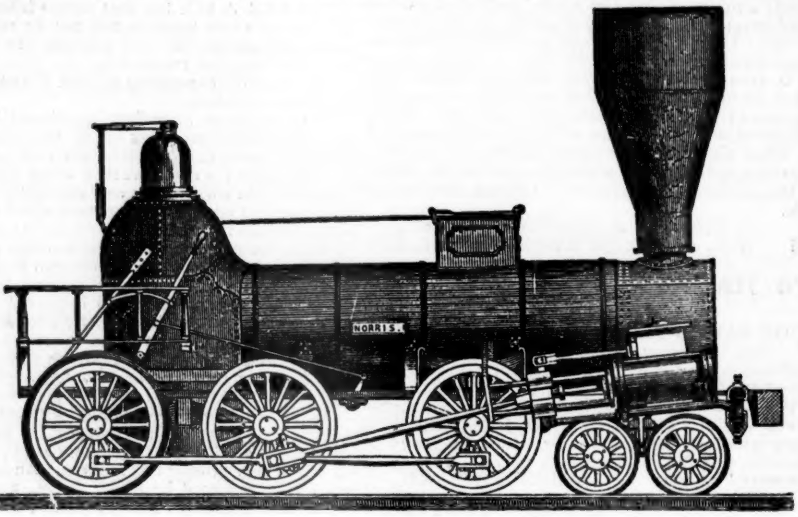
And recently enlarged their Establishment, (making it now the most extensive in the United States,) they are prepared to manufacture to order Locomotive Engines and Cars of every description. Stationary Engines, Steam Hammers, Boilers, and all kinds of Railroad Machinery. Also, Castings and Forge Irons of all kinds —including Chilled Wheels, Frogs, Chairs, Switches, Car Axles, and Locomotive Cranks, Connecting Rods, Steel Springs, Bolts, etc., etc. Orders from all parts of the country solicited for Engines and Cars, or any part or parts of the same. All orders will be furnished at short notice, and on as good terms as any manufactory in the country. Coaches pass our works every fifteen minutes during the day, from Brattle St., Boston.

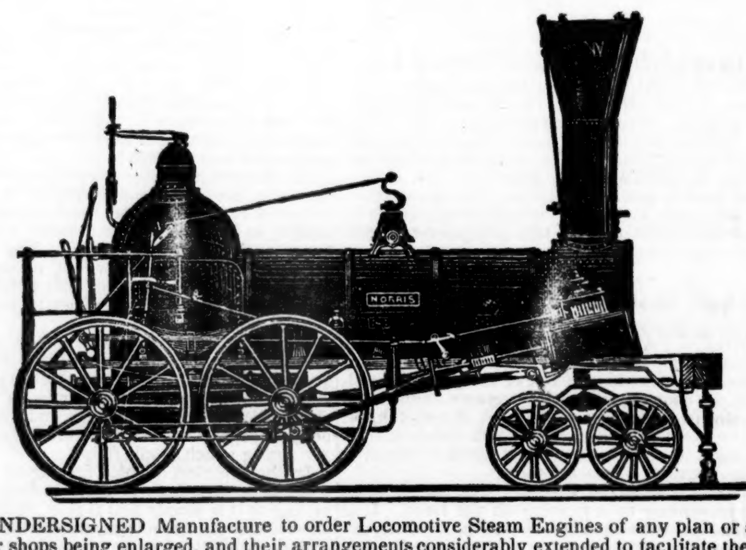
DAVENPORT, BRIDGES & KIRK.

Cambridgeport, Mass., February 16th, 1849.

NORRIS' LOCOMOTIVE WORKS.

BUSHHILL, SCHUYLKILL SIXTH-ST., PHILADELPHIA,





THE UNDERSIGNED Manufacture to order Locomotive Steam Engines of any plan or size.

Their shops being enlarged, and their arrangements considerably extended to facilitate the speedy execution of work in this branch, they can offer to Railway Companies unusual advantages for prompt delivery of Machinery of superior workmanship and finish.

Connected with the Locomotive business, they are also prepared to furnish, at short notice, Chilled Wheels for Cars of superior quality.

Wrought Iron Tyres made of any required size—the exact diameter of the Wheel Centre, being given, the Tires are made to fit on same without the necessity of turning out inside.

Iron and Brass castings, Axles, etc., fitted up complete with Trucks or otherwise.

NORRIS, BROTHERS,

Mattewan Machine Works.

THE Mattewan Company have added to their Machine Works an extensive LOCOMOTIVE ENGINE department, and are prepared to execute orders for *Locomotive Engines* of every size and pattern–also *Tenders, Wheels, Axles*, and other railroad machinery, to which they ask the attention of those who wish such articles, before they purchase elsewhere.

STATIONARY ENGINES, BOILERS, ETC.,

Of any required size or pattern, arranged for driving *Cotton, Woollen, or other Mills*, can be had on favorable terms, and at short notice.

COTTON AND WOOLLEN MACHINERY,

Of every description, embodying all the modern improvements, second in quality to none in this or any other country, made to order.

MILL GEARING,

Of every description, may be had at short notice, as this company has probably the most extensive assortment of patterns in this line, in any section of the country, and are constantly adding to them.

TOOLS.

Turning Lathes, Slabbing, Plaining, Cutting and *Drilling Machines*, of the most approved patterns, together with all other tools required in machine shops, may be had at the Mattewan Company's Shops, Fishkill Landing, or at 39 Pine street, New York.

WM. B. LEONARD, *Agent*.

IRON BRIDGES, BRIDGE & ROOF BOLTS, etc. STARKS & PRUYN, of Albany, New York, having at great expense established a manufactory with every facility of Machinery for Manufacturing Iron Bridges, Bridge and Roof Bolts, together with all kinds of the larger sizes of Screw Bolts, Iron Railings, Steam Boilers, and every description of Wrought Iron Work, are prepared to furnish to order, on the shortest notice, any of the above branches, of the very best of American Refined Iron, and at the lowest rates.

During the past year, S. & P. nave furnished several Iron Bridges for the Erie Canal, Albany Basin, etc. —and a large amount of Railroad Bridge Bolts, all of which have given the most perfect satisfaction.

They are permitted to refer to the following gentlemen:

Charles Cook, Nelson J. Beach, Jacob Hinds,	Canal Commissioners of the State of New York.
Willard Smith, Esq.,	Engineer of the Bridges for the Albany Basin.
Messrs. Stone & Harris, Mr. Wm. Howe,	Railroad Bridge Builders, Springfield, Mass.
Mr. S. Whipple,	Engineer & Bridge Builder, Utica, N. Y.

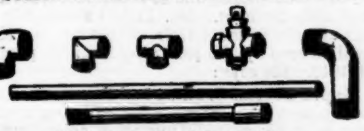
January 1, 1849.

TO RAILROAD COMPANIES AND BUILDERS OF MARINE AND LOCOMOTIVE ENGINES AND BOILERS.

PASCAL IRON WORKS.

WELDED WROUGHT IRON TUBES

From 4 inches to $\frac{1}{4}$ in calibre and 2 to 12 feet long, capable of sustaining pressure from 400 to 2500 lbs. per square inch, with Stop Cocks, T's, L's, and other fixtures to suit, fitting together, with screw joints, suitable for STEAM, WATER, GAS, and for LOCOMOTIVE and other STEAM BOILER FLUES.



Manufactured and for sale by

MORRIS, TASKER & MORRIS.

Warehouse S. E. Corner of Third & Walnut Streets,

PHILADELPHIA.

THE NEWCASTLE MANUFACTURING Co. continue to furnish at the Works, situated in the town of Newcastle, Del., Locomotive and other steam engines, Jack Screws, Wrought Iron Work and Brass and Iron Castings, of all kinds connected with Steamboats. Railroads, etc.; Mill Gearing of every description; Cast Wheels (chilled) of any pattern and size, with Axles fitted, also with wrought tires, Springs, Boxes and bolts for Cars; Driving and other wheels for Locomotives.

The works being on an extensive scale, all orders will be executed with promptness and despatch. Communications addressed to Mr. William H. Dobbs, Superintendent, will meet with immediate attention.

ANDREW C. GRAY,
President of the Newcastle Manuf. Co.

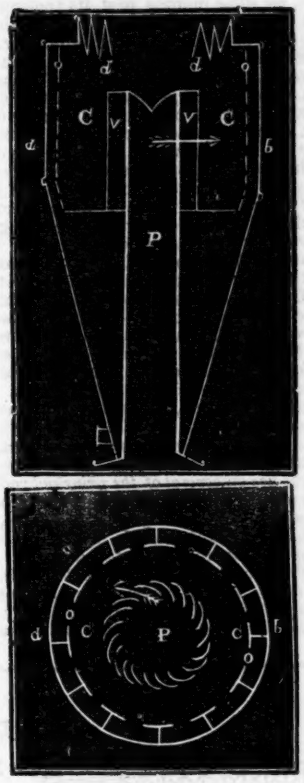
PATENT MACHINE MADE HORSE-SHOES.

The Troy Iron and Nail Factory have always on hand a general assortment of Horse Shoes, made from Refined American Iron.

Four sizes being made, it will be well for those ordering to remember that the size of the shoe increases as the numbers—No. 1 being the smallest.

P. A. BURDEN, *Agent*,
Troy Iron and Nail Factory, Troy, N. Y.

FRENCH & BAIRD'S Patent Spark Arrester.



TO THOSE INTERESTED IN RAILROADS. Railroad Directors and Managers are respectfully invited to examine an improved Spark Arrester recently patented by the undersigned.

Our improved Spark Arresters have been extensively used during the last year on both Passenger and Freight Engines, and have been brought to such a state of perfection, that no annoyance from sparks or dust from the chimney of engines on which they are used is experienced.

These Arresters are constructed on an entirely different principle from any heretofore offered to the public. The form is such that a rotary motion is imparted to the heated air, smoke and sparks passing through the chimney, and by the centrifugal force thus acquired by the sparks and dust, they are separated from the smoke and steam, and thrown into an outer chamber of the chimney through openings near its top, from whence they fall by their own gravity to the bottom of this chamber; the smoke and steam passing off at the top of the chimney, through a capacious and unobstructed passage, thus arresting the sparks without impairing the power of the engine by diminishing the draught or activity of the fire in the furnace.

These chimneys and arresters are simple, durable and neat in appearance. They are now in use on the following roads, to the managers and other officers of which we are at liberty to refer those who may desire to purchase, or obtain further information in regard to their merits.

R. L. Stevens, president Camden and Amboy railroad company; Rich'd Peters, sup't Georgia railroad, Augusta, Ga.; G. A. Nicolls, sup't Reading railroad, Reading, Pa.; W. E. Morris, pres't Philadelphia, Germantown and Norristown railroad company, Philad.; E. B. Dudley, pres't W. and R. railroad co., Wilmington, N. C.; Col. Jas. Gadsden, pres't S. Carolina railroad co., Charleston, S. C.; W. C. Walker, agent V. and J. railroad, Vicksburg, Miss.; R. S. Van Rensselaer, sup't Hart. and N. H. railroad; W. R. McKee, sup't Lexington and Ohio railroad; T. L. Smith, sup't N. Jersey railroad and transp. co; J. Elliott, sup't M. P., Philadel. and Wilm. railroad; J. O. Sterns, sup't Elizabethtown and Somerville railroad; R. R. Cuyler, pres't Central railroad, Savannah, Ga.; J. D. Gray, sup't Macon, (Ga.) railroad; J. H. Cleveland, sup't of Southern railroad, Monroe, Mich.; M. F. Crittenden, sup't mo. power Central railroad, Detroit, Mich.; G. B. Fisk, pres't Long Island railroad, Brooklyn, L. I.

Orders for these chimneys and arresters, addressed to the subscribers, care of Baldwin and Whitney, of Philadelphia, will be promptly executed.

The subscribers will dispose of single rights, or rights for one or more States on reasonable terms.

FRENCH & BAIRD.

Philadelphia, Pa., April 6, 1844.

The letters in the figures refer to the article given in the Journal of June, 1844.

Improvement for Lessening Friction on Railroads.

THE Improvement sometime since perfected for lessening the friction on rails, cars and engines, having been fairly tested, and found to possess all the advantages anticipated, is now presented to the notice of parties connected with railroad companies.

The article used is India-rubber, chemically combined with a metalic substance, in such a manner as to give it a remarkable degree of strength and durability, and the peculiar quality of not being affected by abrasion, or the extremes of either heat or cold.

The advantages derived from its application are briefly as follows:

1st, A sensible lessening of friction on the rails, and of wear and tear to the machinery of the locomotives and cars.

2d, A general benefit to the whole superstructure of the road, by the trains passing with an easier and less jarring action.

3d. A greater degree of comfort to the passengers, owing to the exemption from the usual loud and annoying rattling of the cars and engines.

4th, An increased speed to the trains, with the same power, arising from the uniform steadiness and decrease of friction to the rails, cars, etc.

And lastly, a material saving in the annual expenditure for repairs.

A drawing, illustrating the application of India-rubber to this purpose, will be found in the American Railroad Journal, under date of May 26, 1849.

The annexed certificate, among others in the hands of the patentee, will explain the nature of this improvement.

"J. ELNATHAN SMITH, Esq.,

Dear Sir: In relaying the New Orleans and Carrollton railroad, I applied Vulcanized India-rubber in the Chairs, under the *joints* of the rails, of 1-10 of an inch thick, with the happiest result. The road thus laid has been in constant daily use since August last, and I cannot perceive the least deterioration. The rubber acts admirably as a *wedge*, in the way I use it, as well as a perfect preventive of the battering down of the ends of the rails. It also makes the road unusually smooth —for in riding over it I have not been able to detect the joints; and I have had the assertion of several observers of such matters to the same effect. We are delighted with it here, and think it a very important simple, and cheap acquisition in the permanent maintenance of railroads.

The annexed sketch of the chair I use, will give an idea how the rubber acts as a wedge. They weigh 13 lbs. and are 7 inches square—are accurately cast to one size, and when in their places, ready for the rails, I place a piece of the rubber 1-10 of an inch thick thereon. The width of the base of the rail, and the length of the chair is $3\frac{1}{2}$ by 7 inches. The rail is then forced in *sideways*, which, owing to there being but 1-16 of an inch space for 1-10 inch thickness of rubber, requires considerable pressure; consequently, the elasticity keeps the rail tight up to the clip of the chair A. I have closely observed the joints when the engine passed over them, but could not detect any depression of the rails separate from each other.

I find that the cost for the rubber will be about 7 cts. per *joint*, which for 21 feet rails, will be about $35 per mile, *exclusive of the patent right*.

The rubber I use is of excellent quality, and made in pieces of about 20 to 30 yards long, and 25 inches wide, (1-10 of inch thick,) and weighs about 4 lbs. to the yard in length. I cut 7 pieces in the width, consequently 7 inches in length makes 7 pieces or 7 yards, weighing about 28 lbs., will give 252 pieces, or half a mile of road with 21 feet rails. I am respectfully yours,

JOHN HAMPSON,
Eng. New Orleans and Carrollton Railroad."

New Orleans, March 14, 1849.

Orders received and full information by
J. ELNATHAN SMITH, Patentee,
22 John street,
New York, May 25, 1849.

Fuller's Patent India-Rubber Springs.

THERE *can now be no ground of opposition whatever to these Springs.* The Commissioner of Patents has not only rejected the application for a Patent for a similar Spring, but *a Patent has just been granted for an entirely new species of India Rubber*, the quality of which can be surpassed by no other kind, as the experiments which have lately been publicly made, have fully proved. No extremes of heat or cold can effect it, nor will any amount of pressure permanently alter its shape. This Patent refutes the statement of the "New England Car Company" as to their sole right to use India Rubber.

The Spring (composed by alternate layers of India Rubber Discs and Metal Plates) is superior to any other form of Spring, for several reasons: It is the lightest, the most simple and most durable—there being less friction in this than in other kind; it can be regulated to any extent desired. A less quantity of Rubber is required in this form to make a good spring than in any other because each disc or ring of India Rubber is firmly supported by metal plates, and forms in itself a distinct spring—nor is any spiral spring required. The Patentee is consequently able to supply efficient springs at a less cost than any other parties can do. Purchasers are guaranteed in the use of these springs.

The New England Car Company have *no* right to make an India-rubber Spring with a Bolt through the centre. All companies using such a spring are liable to an action.

Fuller's spring has been used nearly four years with complete success. It is applicable equally to Passenger and Freight Cars, to Locomotives and Tenders.—Bumpers and Draw Springs are always kept on hand, which merely require screwing to a car. It has lately been applied also to several kinds of *Machines*.

Action will be brought against all persons infringing upon these patents.

The subscriber will show Models and Drawings of the various modes of application to Cars, Machines, Omnibuses, &c. G. M. KNEVITT, Agent.

Principal office, No. 38 Broadway, New York.

Branch office, Messrs. James Lee & Co.'s, No. 18 India Wharf, Boston.

Mr. Hale, the President of the Boston and Worcester Railroad, wrote an article concerning Fuller's Springs. The "New England Car Company" take the liberty of publishing that article, omitting, however, a very important part; it is therefore given in full now, and the portion omitted by the New England Car Company is printed in italics, that the public may judge the manner in which this "company" pervert Mr. Hale's meaning.

[*From the Boston Advertiser of the 7th June*].

INDIA RUBBER SPRINGS FOR RAILROAD CARS.

"Of the numerous uses to which the wonderful elasticity and durability of India rubber, renders this material applicable, we are hardly aware of one, in which it has been more successful than in forming springs for railroad cars. We have had occasion to observe, for some months past, its application to this use, on one of the passenger cars on the Newton special train of the Boston and Worcester railroad.—It is there used not only for the springs on which the car rests, but for the springs attached to the draw bar, at each end of the car, to prevent any jar on the sudden commencement, or interruption of the motion of the car. For both these purposes it seems to be admirably adapted, and we do not learn that during that period in which it has been used, any defect has been discovered. It renders the movements of the car extremely easy, and protects it more effectually, we think, than any other spring we have seen in use, from every harsh or unpleasant motion, either vertical or horizontal. It is also simple in its form and application, extremely light, and little liable to get out of repair. During the period of some months in which we have seen the springs in operation, there is no apparent wear or diminution of its efficiency. *Each spring is composed of several circular layers of rings of India rubber, a thin metallic plate of the same size being interposed between each of the layers. From the simplicity of its form, it cannot be expensive, and it admits of being made more or less elastic almost at pleasure. The invention, we understand, was first patented in England, where it has been introduced into general use on several of the principal railroads, and we have no doubt it will come into very extensive use in this country. The patent for this invention, we understand, has been granted to Mr. W. C. Fuller, in England and France, and also in this country. Mr Knevitt, of New York, is the agent for the patentee in the United States, and he has established a branch office for the supply of the article in this city, as may be learned from an advertisement in another column of this paper.*"

RIDER'S PATENT IRON BRIDGE.

THE RIDER IRON BRIDGE having been fully tested on the Harlem Railroad, by constant use for about eighteen months, and found to answer the full expectations of its most sanguine friends, is now offered to the public with the utmost confidence as to its great utility over any other Bridge now known.

The plan of this Bridge is to use the iron so as to obtain its greatest longitudinal strength, and at the same time is so arranged as to secure the combined principles of the *Arch, Suspension and Triangle*, all under such controlling power as causes each to act in the most perfect and secure manner, and at the same time impart its greatest strength to the whole work.

THE IRON RIDER BRIDGE COMPANY are prepared to furnish large quantities of Iron Bridging for Railroad or other purposes, made under the above patent, at short notice, and at prices far *more economical* than the best wood structure, and on *certain conditions*, the first cost may be made the same as wood.

Models, and pamphlets giving full descriptions of the RIDER BRIDGE, with certificates based on actual trial from undoubted sources, will be found at the office of the Company, 74 BROADWAY, *up stairs*, or of W. RIDER & BROTHERS, 58 *Liberty Street*, where terms of contract will be made known, and where orders are solicited.

M. M. WHITE,
Agent for the Company.

November 25, 1848.

RAILROAD India-rubber Springs.

IF any Railroad Company or other party desires it, the NEW ENGLAND CAR COMPANY will furnish India-rubber Car Springs made in the form of washers, with metalic plates interposed between the layers, or in any other form in which they can be made; in all cases guaranteeing the right to use the same against any and all other pretended rights or claims whatsoever.

F. M. Ray, 98 Broadway, New York.
E. CRANE, 99 State Street, Boston.

May 24, 1849.

LAP-WELDED WROUGHT IRON TUBES for Tubular Boilers, from $1\frac{1}{4}$ to 15 inches diameter, and any length not exceeding 17 feet—manufactured by the Caledonian Tube Company, Glasgow, and for sale by IRVING VAN WART,
12 Platt street, New York.

JOB CUTLER, *Patentee.*

☞ These Tubes are extensively used by the British Government, and by the principal Engineers and Steam Marine and Railway Companies in the Kingdom.

F. M. Ray's Patent India-rubber Car Springs.

India-rubber Springs for Railroad Cars were first introduced into use, about two years since, by the inventor. The New England Car Company, now possesses the exclusive right to use, and apply them for this purpose in the United States. It is the only concern that has tested their value by actual experiment, and in all arguments in favor of them, drawn from experience of their use, are in those cases where they have been furnished by this company. It has furnished every spring in use upon the Boston and Worcester road, and, in fact, it has furnished all the springs ever used in this country, with one or two exceptions, where they have been furnished in violation of the rights of this company; and those using them have been legally proceeded against for their use, *as will invariably be done in every case of such violation.*

The Spring formed by alternate layers of India-rubber discs and metal plates, which Mr. Fuller claims to be his invention, was invented by Mr. Ray in 1844.—In proof of which we give the deposition of Osgood Bradley, of the firm of Bradley & Rice, of Worcester, Mass., car manufacturers, and men of the highest respectability. In this deposition, in relation to the right of parties to use these springs, he says:

"I have known Mr. Ray since 1835. In the last of May or the commencement of June, 1844, he was at my establishment, making draft of car trucks. He staid there until about the first of July, and left and went to New York. Was gone some 8 or 10 days, and returned to Worcester. He then on his retnrn said he had a spring that would put iron and steel springs into the shade. Said he would show it to me in a day or two. He showed it to me some two or three days afterwards. It was a block of wood with a hole in it. In the hole he had three pieces of India-rubber, with iron washers between them, such as are used under the nuts of cars. Those were put on to a spindle running through them, which worked in the hole. The model now exhibited is similar to the one shown him by Ray. After the model had been put into a vice, witness said that he might as well make a spring of putty. Ray then said that he meant to use a different kind of rubber, and referred to the use of *Goodyear's Metallic Rubber*, and that a good spring would grow out of it." There are many other depositions to the same effect.

The history of the invention of these springs, together with these depositions, proving the priority of the invention of Mr. Ray, will be furnished to all interested at their office in New York.

This company is not confined to any particular form in the manufacture of their springs. They have applied them in various ways, and they warrant all they sell.

The above cut represents precisely the manner in which the springs were applied to the cars on the Boston and Worcester road, of which Mr. Hale, President of this road speaks, and to which Mr. Knevitt refers in his advertisement. Mr. Hale immediately corrected his mistake in the article quoted by Mr. Knevitt, as will be seen by the following from his paper of June 8, 1848. He says:

INDIA-RUBBER SPRINGS FOR RAILROAD CARS.—"In our paper yesterday, we called attention to what promises to be a very useful invention, consisting of the application of a manufacture of India-rubber to the construction of springs for railroad cars. Our object was to aid in making known to the public, what appeared to us the valuable properties of the invention, as they had been exhibited on trial, on one of the passenger cars of the Boston and Worcester railroad. As to the origin of the invention we had no particular knowledge, but we had been informed that it was the same which had been introduced in England, and which had been subsequently patented in this country; and, we were led to suppose that the manufacturers who have so successfully applied this material, in the case to which we referred had become possessed of the right to use that patent. It will be seen from the following communication, addressed to us by a member of the company, by which the Worcester railroad was supplied with the article upon which our remarks were based, that we were in an error, and that the springs here introduced are an American invention, as well as an American manufacture. How far the English invention may differ from it we have had no opportunity of judging."

MR. HALE:—"The New England Car Co., having been engaged for the last six months in introducing the Vulcanized India-rubber Car Spaings upon the different railroads in this and other states, and having in particular introduced it upon the Boston and Worcester railroad with perfect success, were much gratified to find, by your paper of this morning, that the article had given satisfaction to the president of that corporation, and the terms of just commendation in which you were pleased to speak of it. But their gratification was scarcely equalled by their surprise, when, or arriving at the close of your paragraph, they found the results of all their labors attributed to a foreign source, with which the New England Car Co. has no connection. The material used on the Boston and Worcester railroad, and all the other railroads in this country, where any preparation of India-rubber has been successfully applied, is entirely an American invention, patented in the year 1844 to Charles Goodyear, of New Haven, Conn., and the application of it to this purpose and the form in which it is applied are the invention of F. M. Ray of New York. The only material now in use, and so far as has yet appeared, the only preparation of India rubber capable of answering the purpose, has been furnished under these patents by the New England Car Company, manufactured under the immediate inspection of their own agent. If any other should be produced, the right to use it would depend upon the question of its interference with Mr. Goodyear's patent. The New England Car Company have their place of business in this city at No. 99 State street, and are prepared to answer all orders for the Vulcanised India rubber Car Springs, of the same quality and of the same manufacture as those which they have already placed on your road, and most fo the other roads terminating in this city."

And yet Mr. Knevitt is using these experiments made upon the Springs of the Car Company to induce the public to purchase his springs, and is attempting to impose upon them the belief that the springs used were furnished by him! We ask whether such a course is honorable, or entitles his statements to much consideration from the public.

The above Springs are for sale 98 Broadway, New York, and 99 State street, Boston.

EDWARD CRANE Agent, Boston.
F. M. RAY, Agent, New York.

Boston, May 8, 1849.

Devlan's Machinery Oil.

THE Subscribers, Agents for P. S. Devlan & Co's "Patent Lubricating Oil"—price 80c. per gallon 4 mos. or 3 per cent off for cash.

We refer to the following certificate of Messrs. Norris Brothers, in whose works, any one by calling can see the oil in use and judge for themselves.

NORRIS' LOCOMOTIVE WORKS.
Philadelphia, April 2, 1849.

We have been using throughout our Works, during the last six weeks, "Devlan's Lubricating Oil," and so far as we have been able to judge from its use, we think it preferable to the sperm oil generally used, for both heavy and light bearings.

NORRIS, BROTHERS.

For sale by ALLEN & NEEDLES,
22 & 23 South Wharves,
14tf Philadelphia Pa.

Coal.

CUMBERLAND SEMI-BITUMINOUS COAL superior quality for Locomotives, for sale by

H. B. TEBBETTS,
No. 5½ Pine St., New York.

May 12, 1849. 1m19

RAILROADS.

NORWICH AND WORCESTER RAILROAD. Summer Arrangement.—1849.

Accommodation Trains daily (Sundays excepted.)

Leave Norwich at 5 am., and 5 pm.
Leave Worcester at 10½ am., and 4½ pm., connecting with the trains of the Boston and Worcester, Providence and Worcester, Worcester and Nashua and Western railroads.

New York & Boston Line. Railroad & Steamers. Leave New York and Boston daily, Sundays excepted, at 5 pm.—At New York from pier No. 18, North River.—At Boston from corner Beach and Albany streets, opposite United States Hotel. The steamboat train stops only at Framingham, Worcester, Danielsonville and Norwich.

Freight Trains leave Norwich and Worcester daily, Sundays excepted.—From Worcester at 6½ am., from Norwich at 9 am.

32 1y S. H. P. LEE, JR., Sup't.
May 20, 1849.

EASTERN RAILROAD, Spring and Summer Arrangement. On and after Thursday, March 15,'49, Trains will leave Eastern Railroad Depot, Eastern Avenue, Commercial-street, Boston, daily, (Sundays excepted.)

For Lynn, 7, 10, a.m., 12, 2½, 3, 4½, 5¾, 7, p.m.
Salem, 7, 10, a.m., 12, 2½, 3, 4½, 5¾, 7, p.m.
Manchester, 10, a.m., 3, 5¾ p.m.
Gloucester, 10, a.m., 3, 5¾ p.m.
Newburyport, 7, a.m., 2½, 4½, 7, p.m.
Portsmouth, 7, am., 2½, 4½, pm.
Portland, Me., 7, am., 2½, pm.

And for Boston,

From Portland, 7½, am., 3, pm.
Portsmouth, 7, 9¾*, am., 5¼*, pm.
Newburyport, 6, 7¾, 10½*, am., 6*, pm.
Gloucester, 7, am.,2, 5¼ pm.
Manchester, 7¼, am., 2¼, 5½ pm.,
Salem, 7, 8*, 9*, 10½, 11-40*, am., 2¾, 6*,7* pm.
Lynn, 7¼, 8¼*, 9¼*, 10¾, 11-55*, am., 3, 6¼*, 7¼*, pm.

* *Or on their arrival from the East.*

MARBLEHEAD BRANCH.

Trains leave
Marblehead for Salem, 6¾, 8¾, 10¼, 11-25, am. 2¾, 4¾, 5¾, pm.
Salem for Marblehead, 7¾, 9½, 10¾, am., 12¾, 3¼, 5¼, 6¼, pm.

GLOUCESTER BRANCH.

Trains leave
Salem for Manchester at 10¾, am., 3¾, 6¼ pm.
Salem for Gloucester at 10¾, am., 3¾, 6¼, pm.
Trains leave
Gloucester for Salem at 7, am., 2, 5¼ pm.
Manchester for Salem at 7¼, am., 2¼, 5½, pm.

Freight trains each way daily. Office 17 Merchants' Row, Boston.

Feb. 3. JOHN KINSMAN, Superintendent.

BOSTON AND MAINE RAILROAD.

Spring Arrangement, 1849.
Outward Trains from Boston

For Portland at 6¾ am. and 2¼ pm.
For Rochester at 6¾ am., 2¼ pm.
For Great Falls at 6¾ am., 2¼, 4¼ pm.
For Haverhill at 6¾ and 12 m., 2¼, 4¼ 6 pm.
For Lawrence at 6¾, 9, am., 12 m., 2¼, 4¼, 6, 7½ pm.
For Reading 6¾, 9 am., 12 m., 2¼, 4¼, 6, 7½, 9¼* pm.

Inward trains for Boston

From Portland at 7½ am., 3 pm.
From Rochester at 9 am., 4½ pm.
From Great Falls at 6½, 9¼ am., 4¾ pm.
From Haverhill at 7, 8¼ 11 am., 3, 6½ pm.
From Lawrence at 6, 7¼, 8½, 11½, am., 1½, 3¼, 7 pm.
From Reading at 6½, 7¾, 9, am., 12 m., 2, 3¾, 6, 7½ pm.

MEDFORD BRANCH TRAINS.

Leave Boston at 7, 9¼ am., 12¾, 2½, 5¼, 6¼, 9¼* pm.
Leave Medford at 6½, 8, 10¼ am., 2, 4, 5½, 6½, pm.

* On Thursdays, 2 hours; on Saturdays, 1 hour later. CHAS. MINOT, Super't.

Boston, March 27 1849.

BOSTON & LOWELL RAILROAD. Passenger trains run as follows, viz:

Express Trains.

Leave Boston at 7½ a.m., 12 m. and 5 p.m.
Leave Lowell at 8 a.m., 12 m. and 4 55 p.m.—or on the arrival of the train from Nashua.

Accommodation Trains.

Leave Boston at 7 5 and 9½ a.m., 2½, 4½ & 6½ p.m.
Leave Lowell at 7 and 10 a.m., 2. 5 and 6 p.m.

Woburn Branch Trains.

Leave Woburn Centre at 6, 7, 9, 10 a.m., 1½ and 4½ p.m.
Leave Boston at 8, 11½ a.m., 3, 5½ and 7 p.m.

On Saturdays, the last train leaves at 8 instead of 7 p.m.

The trains from Boston at 7½ a.m., and 5 p.m., and from Lowell at 4 55 p.m., do not stop at Way Stations. The trains from Lowell at 8 a.m. and from Boston and Lowell at 12 m., stop at no way station except Woburn Watering Place, and there only for Upper Railroad Passengers.

WALDO HIGGINSON,
Agent Boston and Lowell Railroad Cor.

Boston March 5, 1849. 22tf.

ESSEX RAILROAD—SALEM to LAWRENCE, through Danvers, New Mills, North Danvers, Middleton, and North Andover. On and after Thursday, March 15, trains leave daily (Sundays excepted,) Eastern Railroad Depot, Washington-st.

Salem for South Danvers at 8, am., 12.45, 3.45, 6.30, pm.
Salem for North Danvers at 8, am., 12.45, 3.45, pm.

Salem for Lawrence,	8, am., 3.45, pm.
" North Andover	8, am., 3.45, pm.
" Middleton	8, am., 3.45, pm.

South Danvers for Salem at 6.45, 10.15, am., 2·15, 5.45, pm.

North Danvers	"	10, am., 2, 5.40, pm.
Middleton	"	9 45, am., 5 15, pm.
North Andover	"	9.20, am., 5.05, pm.
Lawrence	"	9 15, am., 5, pm.

JOHN KINSMAN, Superintendent.
Salem, Oct. 2, 1848.

BOSTON AND PROVIDENCE RAILROAD. On and after MONDAY, APRIL 2d, the Trains will run as follows:—

Steamboat Train—Leave Boston at 5 pm Leaves Providence on the arrival of the train from Stonington.

Accommodation Trains—Leave Boston at 8 am., and 4 pm. Leave Providence at 8½, a.m., and 4, pm.

Dedham Trains—Leave Boston at 8½ am, 12 m., 3¼, 6¼, and 10½ pm. Leave Dedham at 7,9½, am., 2¼, 5, and 8 pm.

Stoughton Trains—Leave Boston at 1 am., and 5½ pm. Leave Stoughton at 11½ am., and 3¾ pm.

Freight Trains—Leave Boston at 11 am., and 6 pm. Leave Providence at 4 am., and 7.40 am.

On and after Wednesday, Nov. 1, the DEDHAM TRAIN will run as follows: Leave Boston at 9 am., 12 m., 3, 5¾, and 10½ pm. Leave Dedham at 8, 10¾, am., 1¾, 4¼, and 9 pm.

WM. RAYMOND LEE, Sup't.

FITCHBURG RAILROAD.—On and after Monday, April 23d, 1849, Trains will run as follows:

Express Train.

Leaves Boston at 7½ a.m.; Fitchburgh at 3 55 p.m. or upon arrival of the trains from the upper roads.

Accommodation Up Trains.

For Groton, West Townsend and Fitchburg, 6 50 and 11 a.m. and 3 40 p.m.
Concord, 6 50 and 11 a.m., 3 40 and 7 p.m.
Waltham, 6 50, 7 35, 10 and 11 a.m., 1 45, 3 25, 3 40 and 7 p.m.
Fresh Pond, Mount Auburn and Watertown, 9 a.m., 12 m. and 2 20 and 7 15 p.m.
West Cambridge and Lexington, 9 30 a.m., 2 30 and 6 30 p.m.

Down Trains.

From Fitchburg, 7 50, 11 55 a.m. and 4 40 p.m.
West Townsend, 7 30, 11 55 a.m. and 4 40 p.m.
Groton, 8 20 a.m., 12 30 and 5 15 p.m.
Concord, 6 25 and 9 a.m., 1 10 and 5 55 p.m.
Waltham, 6 50, 8 15, 9 25 and 11 a.m, 1 35, 2 35, 4 30 and 6 20 p.m.
West Cambridge and Lexington, 7 and 11 15 a.m and 4 45 p.m.
Fresh Pond, Mount Auburn and Watertown, 7 15 and 10 a.m., 1 30 and 4 30 p.m.

The 6 50 a.m. up train will not stop at Stony Brook, Lincoln and Lunenburg.

The 11 a.m. up train will not stop at Weston and West Acton.

The 3 40 pm. up train will not stop at Charlestown Porters, West Cambridge and Lunenburg.

The morning train down will not stop at Lunenburg and Lincoln.

The evening train down will not stop at Lunenburg and Stony Brook.

S. M. FELTON, Superintendent.
Boston, April 21, 1849. 22tf

CORROSIVE SUBLIMATE.

THIS article now extensively used for the preservation of timber, is manufactured and for sale by POWERS & WEIGHTMAN, manufacturing Chemists, Philadelphia.

Jan. 20, 1849.

NEW YORK AND ERIE RAILROAD. EXTENDED TO OWEGO.

On and after the 1st June, the trains will run as follows, daily, excepting Sundays: For Passengers—Through trains will leave New York for Owego e by steamboat, from the Duane-st. pier, at 7½ o'clock, A.M. and 5 o'clock, P.M. stopping at Ramapo Station, Chester, Goshen, Middletown, Otisville, Port Jervis and all the way stations west of the last-named place; and will leave Owego on and after the 4th June, at 6 A.M. and 7 P.M.; and Binghamton, on and after the 1st June, at 7 A.M. and 8 P.M. arriving in New York at 7½ P.M. and 8½ A.M. stopping at all the way stations between Owego and Port Jervis; and, east of Port Jervis, at Otisville, Middletown, Goshen, Chester, Ramapo Station and Spring Valley. Way Trains for Port Jervis and all the intermediate stations, will leave New York, by steamboat Thomas Powell, from Duane-st. pier, at 7½ A.M. and 4 P.M.; and will leave Port Jervis at 6 A.M. and 4 P.M. Milk Trains—A train leaves Otisville at 5½ A.M. arriving in New York about 11. The afternoon milk is taken by the train leaving Port Jervis at 4 o'clock P.M. and arriving in New York about midnight. Freight—Freight leaves New York every night for all the regular stations on the road. A freight train will leave Owego every morning at 6 o'clock; and another will leave Port Jervis, as usual, every morning at 8 o'clock, with market freight, &c. JAS P. KIRKWOOD,

May 30, 1849. Superintendent.

NEW YORK & HARLEM RAILROAD, DAILY. WINTER ARRANGEMENT.

ON and after December 1st, 1848, the Cars will run as follows, until further notice:—

Trains will leave the City Hall, New York, for Harlem and Morrisiana at 7, 9, 9.30, 11, am. 12 m., 2, 4, 4.15, 5.30, pm.

Trains will leave the City Hall, New York, for Fordham and Williams' Bridge, at 7 30 and 9 30 am., 12 m., 2, 4 15, 5 30 pm.

Trains will leave the City Hall, New York, for Hunt's Bridge, Underhill's and Hart's Corners, at 9 30 am., 4 15 pm.

Trains will leave the City Hall, New York, for Tuckahoe and White Plains, at 7 30 and 9 30 am., 3 and 4 15 pm.

Trains will leave Davis' Brook, Pleasantville, Chapequa, Mount Kisko, Bedford, Mechanicsville, Purdy's and Croton Falls, at 7 30 and 9 30 am., 3 pm.

NOTICE—Passengers are reminded of the great danger of standing upon the platform of the cars, and hereby notified that the practice is contrary to the rules of the Company, and that they do not admit any responsibility for injury sustained by any passenger upon the platforms, in case of accident.

Returning to New York will leave

Morrisiana and Harlem at 7 20, 8, 8 50, 10 am., 12m., 1 35, 3, 3 45, 5, 5 35 pm.
Fordham and William's Bridge at 7, 8 30, 9 50 am., 1 15, 3 25, 5 20 pm.
Hunt's Bridge at 8 20, am., 3 18 pm.
Underhill's Road at 8 10 am., 3 08 pm.
Tuckahoe at 8 05, 9 30 am., 3 05, 5 pm.
Hart's Corners at 7 55 am., 2 52 pm.
White Plains at 7 45, 9 10 am., 2 45, 4 40 pm.
Davis' Brook at 9 am., 2 35, 4 30 pm.
Pleasantville at 8 49 am., 2 20, 4 19 pm.
Mount Kisko at 8 30 am., 2, 4 pm.
Bedford at 8 25 am., 1 55, 3 55 pm.
Mechanicsville at 8 15 am., 1 45, 3 45 pm.
Purdy's at 8 05 am., 1 35, 3 35 pm.
Croton Falls, at 8 am., 1 30, 3 30 pm.

The trains for Harlem and Morrisiana leaving City Hall at 7, 9, 9 30, 11, 12, 2, 4, and 5 30, and from Morrisiana and Harlem at 7 20, 8, 10, 12, 1 35, 3, 3 45, and 5 o'clock, will land and receive passengers at 27th st., 42d, 51st, 61st, 79th, 86th, 109th, 115th, 125th, and 132d streets.

The 7 30 am., and 3 pm. Trains from New York to Croton Falls, and the 8 am. Train from Croton Falls will not stop between White Plains and New York, except at Tuckahoe, Williams' Bridge and Fordham.

A car will precede each train ten minutes to take up passengers in the city. The last car will not stop, except at Broome st. and 32d street.

Freight Trains leave New York at 6 am. and 1 pm.: leave Croton Falls at 7 am. and 2 30 pm., Sundays excepted.

NOTICE—On Sundays the 7 am. to Harlem and Morrisiana, returning at 8 o'clock, and the 7 30 am. to Croton Falls, returning 1 30 pm., will be omitted, and the 7 am. from Williams Bridge will leave at 7 40

ST. LAWRENCE & ATLANTIC RAILROAD COMPANY.

Notice is hereby given that the Trains run twice per day between Montreal and St. Hyacinthe, leaving each terminus alternately, until further notice.

Leaverng St. Hyacinth at	- -	7 am.
" "	- -	3 pm.
Leaving Montreal at	- - -	10 am.
" "	- - -	6 pm.

THOMAS STEERS, *Secretary.*

May 31, 1849.

BALTIMORE AND SUSQUEHANNA RAILROAD.—Reduction of Fare.

Morning and Afternoon Trains between Baltimore and York.—The Passenger Trains run daily, except Sundays, as follows:

Leave Baltimore at - - - -	9 am. and 3½ pm.
Arrive at - - - - -	9 am. and 6½ pm.
Leave York at - - - -	5 am. and 3 pm.
Arrive at - - - - -	12½ pm. & 8 pm.
Leave York for Columbia at	1½ pm. & 8 am.
Leave Columbia for York at	8 am. & 2 pm.

Fare:

Fare to York - - - - -	$1 50
" Wrightsville - - - - -	2 00
" Columbia - - - - -	2 12½

Way points in proportion.

PITTSBURG, GETTYSBURG, AND HARRISBURG.

Through tickets to Pittsburg via stage to Harrisburg - - - - - - -	$9
Or via Lancaster by railroad - - - -	10
Through tickets to Harrisbnrg or Gettysburg -	3

In connection with the afternoon train at 3½ o'clock, a horse car is run to Green Spring and Owing's Mill, arriving at the Mills at - - 5½ pm.
Returning, leaves Owing's Mills at - - 7 am.

D. C. H. BORDLEY, Sup't.

31 ly Ticket Office, 63 North st.

GEORGIA RAILROAD. FROM AUGUSTA TO ATLANTA—171 MILES.

AND WESTERN AND ATLANTIC RAILROAD, FROM ATLANTA TO DALTON, 100 MILES.

This Road, in connection with the South Carolina Railroad, and Western and Atlantic Railroad, now forms a continuous line, 408 miles in length, from Charleston to Dalton Cross Plains) in Murray county, Ga. 32 miles from Chattanooga, Tenn.

RATES OF FREIGHT.		Between Augusta and Dalton. 271 miles.	Between Charleston, and Dalton. 408 miles.
1st class	Boxes of Hats, Bonnets, and Furniture, per cub-foot - -	$0 18	$0 28
2d class	Boxes and Bales of Dry Goods, Saddlery, Glass, Paints, Drugs, and Confectionary, per 100 lbs.	1 00	1 50
3d class	Sugar, Coffee, Liquor, Bagging, Rope, Cotton, Yarns Tobacco, Leather, Hides, Copper, Tin, Feathers, Sheet Iron, Hollow ware, Castings, Crockery, etc.	0 60	0 85
4th class	Flour Rice, Bacon, Pork, Beef, Fish, Lard, Tallow, Beeswax, Bar Iron, Ginseng, Mill Gearing, Pig Iron, and Grindstones, etc. - - - -	0 40	0 65
	Cotton, per 100 lbs. -	0 45	0 70
	Molasses per hogshead -	8 50	13 50
	" " barrel - -	2 50	4 25
	Salt per bushel - -	0 18	
	Salt per Liverpool sack -	0 65	
	Ploughs, Corn Shellers, Cultivators, Straw Cutters, Wheelbarrows - -	0 75	1 50

German or other emigrants, in lots of 20 or more, will be carried over the above roads at 2 cents per mile.

Goods consigned to S. C. Railroad Company will be forwarded free of commissions. Freights payable at Dalton. F. C. ARMS,

44*1y Sup't of Transportation.

LITTLE MIAMI RAILROAD.—WINTER ARRANGEMENT.

Change of Hours.

on and after Thursday, November 9th, 1848, until further notice, Passenger Trains will run as follows:

Leave Depot East Front street at 9½ o'clock, am., and 2½ o'clock, p.m., for Milford, Foster's Crossings, Deerfield, Morrow, Waynesville, Spring Valley, Xenia, Yellow Springs, and Springfield.

Returning, leave Springfield, at 2¾ o'clock, and 9¼ o'clock, am.

Passengers for New York, Boston, and intermediate points, should take the 9½ o'clock, am., Train from Cincinnati.

Passengers for Columbus, Zanesville, Wheeling and intermediate towns, should take the 9½ o'clock, am., Train.

The Ohio Stage Company are running the following lines in connection with the Trains:

A Daily Daylight Line to Columbus from Springfield in connection with the Morning Train from Cincinnati. Also, Daily Lines to Columbus, from Xenia and Springfield, connecting with the 2½ o'clock, pm. Train from Cincinnati.

The 2½, pm., Train from Cincinnati, and 2¾, am., Train from Springfield, are intended for the accommodation of Way Passengers only, and will be eight hours on the road.

Fare from Cincinnati to Xenia		- -	$1 90
Do	do	Springfield - -	2 50
Do	do	Sandusky City -	6 50
Do	do	Buffalo - -	10 00
Do	do	Columbus - -	4 50

For other information and through tickets, apply at the Ticket Office on Broadway, near Front-st., Cincinnati.

W. H. CLEMENTS, Superintendent.

☞ The Company will not be responsible for Baggage exceeding 50 dollars in value, unless the same is returned to the Conductors or Agent, and freight paid at the rate of a passage for every 500 dollars in value to that amount.

BALTIMORE AND OHIO RAILROAD, MAIN STEM.

The Train carrying the Great Western Mail leaves Baltimore every morning at 7½, and Cumberland at 8 o'clock, passing Ellicott's Mills, Frederick, Harper's Ferry, Martinsburgh and Hancock, connecting daily each way with—the Washington Trains at the Relay House seven miles from Baltimore, with the Winchester Trains at Harper's Ferry—with the various railroad and steamboat lines between Baltimore and Philadelphia, and with the lines of Post Coaches between Cumberland and Wheeling and the fine Steamboats on the Monongahela Slack Water between Brownsville and Pittsburgh. Time of arrival at both Cumberland and Baltimore 5½ P. M. Fare between these points $7, and 4 cents per mile for less distances.—Fare through to Wheeling $11, and time about 36 hours, to Pittsburgh $10, and time about 32 hours.—Through tickets from Philadelphia to Wheeling $13, to Pittsburgh $12. Extra train daily, except Sundays, from Baltimore to Frederick at 4 P. M., and from Frederick to Baltimore at 8 A. M.

WASHINGTON BRANCH.

Daily trains at 9 A. M., and 5 P. M., and 12 at night from Baltimore, and at 6 A. M. and 5½ P. M. from Washington, connecting daily with the lines North, South and West, at Baltimore, Washington, and the Relay House. Fare $1 60 through between Baltimore and Washington, in either direction, 4 cents per mile for intermediate distances. s13 y1

PHILADELPHIA, WILMINGTON, & BALTIMORE RAILROAD.

Summer Arrangement.

April 1st, 1849.—Fare $3.

Leave Philadelphia 8½ am., and 10 pm.
Leave Baltimore 9 am, and 8 pm.
Sunday—Leave Philadelphia at 10 pm.
" " Baltimore at 8 pm.
Trains stop at way stations.

Charleston, S. C.

Through tickets Philadelphia to Charleston, $20.

Pittsburg and Wheeling.

Through ticket, Philadelphia to Pittsburg, $12.
" " Wheeling, 13.
Through tickets sold at Philadelphia office only.

Wilmington Accommodation.

Leave Philadelphia at 12 m. 4 and 7 pm.
Leave Wilmington at 7½ am., 4½ and 7 pm.

Newcastle Line.

Leave Philadelphia at 2½ pm.—Baltimore at 1½ pm.
Fare $3.—Second class, $2.

N.B.—Extra baggage charged for.

I. R TRIMBLE, Gen. Supt.